Canadian Field-Naturalist

1903. VOL. XVII. 1903.

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UNIVERSITY OF TORONTO
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THE

OTTAWA NATURALIST,

Being Vol. XIX. of the

TRANSACTIONS

OF THE

OTTAWA FIELD-NATURALISTS' CLUB,

Organized March, 1879. Incorporated March, 1884.

65537
9/5/05

OTTAWA, CANADA:
OTTAWA PRINTING COMPANY (LIMITED.)
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THE OTTAWA NATURALIST.

VOL. XVII. OTTAWA, APRIL, 1903. No. 1.

THE REPORT OF THE COUNCIL OF THE OTTAWA FIELD-NATURALISTS' CLUB FOR THE YEAR ENDING MARCH 17TH, 1903.

The total membership of the Club is at present 262, of which 254 are ordinary members and eight corresponding.

Mr. W. T. Macoun represented the Club at the meeting of the Royal Society of Canada held in Toronto in May, and read a report on the work done by the Club during the year.

SOIRÉES.

Seven soirées were held during the winter, the lectures arranged for by the Soirée Committee covering a great variety of subjects. The programme was published on page 210 of THE OTTAWA NATURALIST.

These lectures were delivered as arranged except the last two. Professor E. E. Prince being ill was not able to be present, and Mr. Andrew Halkett kindly undertook to explain the slides, so that the lecture was not postponed. The last part of the programme had to be dispensed with (Mar. 17th) as Dr. Ami was absent from the city. The lecturers were all residents of Ottawa except Professor D. P. Penhallow of McGill University, Montreal. The Council is pleased to be able to report that the whole course has been well attended by appreciative audiences.

EXCURSIONS.

Sub-excursions on Saturday afternoons were arranged for April 12th, 19th and 26th and May 3rd, 10th and 31st. The first and third of these were not held on account of rain. On April 19th about 175 members and friends met at Aylmer and collected

the Mayflower (*Epigæa repens*) and other plants, also insects and rock specimens. A similar excursion was held on May 3rd to Beaver Meadow, west of Hull, Que., when fifty attended. Rideau Park, a new locality, was visited May 10th when forty or fifty members were present. Many plants were found but unfortunately the frost of the previous night had destroyed most of them. Considerable interest was taken in the boulder clay and Utica shale of this locality. Autumn sub-excursions were also held at the end of August and through September to Hull, Aylmer, Rockliffe and the Montreal Road, principally by the botanical and entomological branches. Roots of native violets and other perennial plants were collected. Sub-excursions were held by the entomologists to collect moss for sifting for insects in October, and a list of fifty-one species of beetles was made as well as representatives of some other orders of insects.

Two general excursions were held during the summer to Chelsea. The first on May 17th, when 250 members and friends of the Club attended, and the second on September 6th, when about 200 were present. Both excursions were highly successful.

THE OTTAWA NATURALIST.

THE OTTAWA NATURALIST has been published regularly under the continued editorship of Mr. James M. Macoun. Volume XVI has been completed, consisting of twelve numbers which contain 248 pages and four plates. Uncoloured copies of the Geological Map of the city of Ottawa and vicinity were purchased from the Geological Survey Department for distribution with the December number of THE OTTAWA NATURALIST to all Canadian members of the Club. This map is on the scale of one mile to an inch and covers an area of over twenty miles square. Some copies which remain may still be purchased from the treasurer.

The following are some of the more important papers published during the year :

Birds of Sable Island, N.S.; Canadian Hummingbirds, by W. E. Saunders.

Five New Ranunculi; New Northwestern Plants, by Edw. L. Greene.

Marl Deposits of Eastern Canada, by R. W. Ells.

On the Nepheline Rocks of Ice River, B.C.; Dr. Alfred R. C. Selwyn, C.M.G., F.R.S., Director Geological Survey of Canada, 1869-1894, by A. E. Barlow.

On the Genus Arctophila, by Dr. Theo. Holm.

Notes on some Fresh-water and Land Shells; Description of a Fossil Cyrena ; On the Genus Trimerella, by J. F. Whiteaves.

Notes on the Arboretum and Botanic Gardens, Central Experimetal Farm, by W. T. Macoun.

Notes on Some Canadian Birds, by Wm. H. Moore

Nesting of Some Canadian Warblers (two parts). by Wm L. Kells.

Field Notes on the Geology of the country about Chelsea, Que., H. M. Ami.

Observations on Animals Native in the Algonquin Park, by Andrew Halkett.

The Educational Value of Nature Study, by A. E. Attwood.

Notes on the Size of Hawks' Eggs, by J. E. Keays.

Contributions to Canadian Botany No. XVI, by James M. Macoun.

Ottawa Satyrinæ, A. E. Richard.

Besides these there are numerous short papers on scientific subjects, reports of soirées and excursions and of the work done by the various branches of the Club, and reviews of scientific books.

REPORTS OF BRANCHES.

The Geological Branch did not present any formal report this year as Dr. Ami's paper, which was on the programme for the last soirée, would have covered the same ground. The branch, has, however, continued its work, and leaders in this subject have attended all the excursions and explained the salient geological features of the places visited. Part of the skeleton of a large fish, probably a salmon, was found in a calcareous nodule at Besserer Grove and is now in Dr. Ami's possession.

The Botanical Section reports a most successful year's work. The botanical sub-excursions were well attended, several species new to this region were discovered and many new localities found

for rare species. The more active botanical workers have met twice a month for the purpose of discussing methods of work and other matters of interest, and it is expected that these meetings will result in a more systematic prosecution of botanical work in the vicinity of Ottawa.

The Entomological Branch reports a continuance of useful work both in the field and in the study. Many additions were made during the year to our faunal lists, especially in the order Lepidoptera, and the life histories of many species have been ascertained by breeding specimens. The branch has been holding fortnightly meetings during the winter, with a satisfactory attendance, and the proceedings have been both interesting and profitable to the members. The quickened interest in the subject will doubtless result in increased collecting during the coming season, and of greatly enlarged knowledge of our insects and their habits.

The Ornithological Branch reports that although there was a fair amount of interest manifested in the study of birds there were few who did much systematic work. The dates of arrivals of birds were recorded as usual by several of the members. An interesting feature of the report is the list of birds which breed at the Central Experimental Farm. When the farm was taken over by the Government in 1886, comparatively few birds bred there, but the planting of the trees in the belts and ornamental grounds has increased the number to thirty-eight. THE OTTAWA NATURALIST was well supplied with ornithological notes but unfortunately few of these were written by local members.

The Report of the Zoological Branch recommends the study of the smaller mammalia as likely to afford a useful field of research. This would embrace insectiverous mammals, such as moles and shrews; rodents, such as mice, voles and squirrels; and cheiropterous mammals, or bats. A black squirrel and a silver fox were mentioned as having been recently exhibited alive in shop windows on Sparks street. In regard to batrachians the observations of Mr. W. S Odell concerning *Spelerpes bilineatus* were referred to and Mr. Andrew Halkett exhibited at the meeting at which the report was read three living so-called mud-puppies. The principal part of the report deals with the collecting of

representative Canadian fishes during the past season as a nucleus of a new collection for the Department of Marine and Fisheries, and cites examples belonging to the four great groups into which the fishes of the Dominion are divisible.

The treasurer reports a balance on hand of $41.73.

The Council desires to express its gratification at the honors recently paid two of the members of the Club in the awarding by Cambridge University to Dr. Robert Bell, the President, of the degree of Doctor of Science, and in the granting of the Bigsby Medal to Dr. H. M. Ami, a former president, by the Geological Society of London.

The Council desires to place on record its sense of the loss which the Club has sustained through the sudden death of Dr. J. A. MacCabe, late principal of the Normal School, who for many years was a member of the Club. The Club was much indebted to him for the frequent use of rooms for meetings and for the permanent use of a room for the library. His genial presence and inspiring addresses added much to the interest of the meetings which he attended.

The thanks of the Club are due to Mr. J. F. White, M.A., the present Principal of the Normal School, for continuing to us the privileges we now enjoy; also to the daily newspapers of the city for kindly inserting notices of our meetings free of charge.

Respectfully submitted.

W. J. WILSON,
Secretary.

THE OTTAWA FIELD-NATURALISTS' CLUB.

The Treasurer's Statement for the year ending March 17, 1903.

RECEIPTS.			EXPENDITURE.		
Balance from previous year.		$129 28	Printing OTTAWA NATURALIST, 12 numbers, 248 pp.....	$295 00	
Subscriptions, 1902-03	$136		Illustrations	29 37	
Arrears	62		Authors' extras	33 55	
		198 00	Miscellaneous printing, wrappers, post cards, etc.	19 68	
Advertisements		42 25		377 60	
OTTAWA NATURALISTS sold..		1 30	Postage	24 79	
Maps of Ottawa sold		20	Editor	50 00	
Government grant		200 00		452 39	
			Less 5% for cash on printers' bill ($377.60)	18 88	
					$433 51
			Soirée expenses		68 23
			Geological Survey Dept., 500 copies of Map of Ottawa ..		16 74
			Sundry expenses, postage, stationery, etc		10 82
			Balance.....		41 73
		$571 03			$571 03

Examined and found correct.

J. BALLANTYNE, R. B. WHITE, } Auditors.

ARTHUR GIBSON, Treasurer.

March 17, 1903.

MAILING LIST.

The Publishing Committee is preparing a new mailing list, and members of the Club and subscribers to THE OTTAWA NATURALIST are requested to advise either the Secretary or the Treasurer of any changes that have been made in their addresse . It is the desire of the Publishing Committee to make the mailing list as nearly correct as possible, and in order to do this they must be aided by those who have not received the Club journal regularly.

YUKON HEPATICÆ.

ALEXANDER W. EVANS.

(With Plates I and II.)

Our knowledge of the hepaticæ occurring in the Territory of Yukon is based on two collections. The first was made by Mr. R. S. Williams in 1898, the second by Professor John Macoun in 1902. Mr. Williams's collection was reported upon by Dr. Marshall A. Howe,[1] who listed twenty-four species. One of these species, however, determined from gemmiparous material, is somewhat doubtful and two additional species have since been detected among Mr. Williams's specimens, so that twenty-five are now definitely known from his collection. Of these twenty-five species, fifteen came from Dawson, while the remainder were collected south of the sixtieth parallel and should not therefore, strictly speaking, be included among the hepaticæ of Yukon. Professor Macoun's entire collection was made in the vicinity of Dawson and is composed of thirty-six species, including all except two of those found by Mr. Williams in the same region. At present, therefore, thirty-eight species are known with certainty from Yukon Territory. All of these species have a wide distribution at high latitudes and many of the more common ones are found in temperate regions also. Upon comparing the Yukon species with those found in other arctic countries where the hepaticæ are fairly well known, we find that all except two have been recorded from Norway, all except six from Siberia, all except eight from Greenland, and all except fourteen from the adjacent Territory of Alaska. Eighteen of the species are known from all four of these regions, and it is probable that others have a like circumpolar distribution. Twenty-five of the Yukon species are known from the United States.

Two of the species in Professor Macoun's collection, *Jungermannia Sahlbergii*, Lindb. & Arnell, and *Lophozia Kaurini* (Limpr.) Steph., have not before been recorded from America. The first of these is of especial interest. It was originally described from material collected in the Jenisei region of Siberia. In spite of its

[1] Bull. New York Bot. Garden, 2[6] : 101-105, *pl. 14.* 1901.

strong superficial resemblance to *Lophozia Rutheana*, Lindberg recognized its distinctness and made it the type of his section *Mesoptychia*. Schiffner afterwards raised this section to subgeneric rank under *Lophozia*. The Yukon specimens, however, which are more complete than those originally found, show conclusively that *J. Sahlbergii* should be considered the type of a distinct genus, for which Lindberg's appropriate sectional name may be retained. In the following ennumeration the numbers quoted refer to the specimens collected by Professor Macoun.

Marchantiaceæ

1. ASTERELLA FRAGRANS, (Schleich.) Trevis.
   Hunker Creek (61).

2. PREISSIA QUADRATA, (Scop.) Nees.
   Hunker Creek (62).

3. MARCHANTIA POLYMORPHA, L.
   Dawson (1); West Dawson (Williams).

Metzgeriaceæ.

4. RICCARDIA PINGUIS, (L.) S. F. Gray.
   Dawson (5); Bonanza Creek (85).

Jungermanniaceæ.

5. GYMNOMITRIUM CORALLIOIDES, Nees.
   Indian Divide (98).

6. NARDIA SCALARIS, (Schrad.) S. F. Gray.
   Dawson (Williams).

7. ARNELLIA FENNICA, (Gottsche) Lindb. Meddel. Soc. F. et Fl. Fenn. 14 : 70. 1887. Lindb. & Arnell, Kongl. Sv. Vet. Akad. Handl. 23^6 : 35. 1889.

   Jungermannia Fennica, Gottsche ; G. & R. *Hep. Eur.* 418. 1868.

   Southbya Fennica, Gottsche, *l. c.*

   Hunker Creek (64 *p.p.*); Dawson (Williams), a few fragments only, not listed by Howe. A widely distributed species, now known in the Old World from Norway, Sweden, Finland, Italy and Siberia. In North America the species has been previously collected by Dusén in Greenland, and by

Macoun at Lake Manitoba and in the Rocky Mountains of British Columbia.

MESOPTYCHIA, (Lindb.) gen. nov.

Jungermannia, B. *Eujungermannia*, b *Mesoptychia*, Lindb.; Lindb. & Arnell, Kongl. Sv. Vet. Akad. Handl. 23^5 : 39. 1889.

Lophozia, subgenus *Mesoptychia*, Schiffn.; Engler & Prantl, Die natürl. Pflanzenfam, 1^3 : 85. 1893.

Stem simple or sparingly branched, sometimes with subfloral innovations: rhizoids numerous: leaves alternate, succubous, more or less deeply bilobed and longitudinally folded at about the middle; antical lobe convex; postical lobe concave; underleaves deeply bifid with ciliate divisions: leaf-cells with distinct trigones and verruculose cuticle: ♀ inflorescence terminal on a stem or leading branch; bracts and bracteoles similar to the leaves and underleaves, more or less adnate to the perigynium; perianth free with two rounded lateral keels and a sharper antical keel (*i.e.* epigonianthous), contracted and short-ciliate at the mouth; perigynium pendent at right angles to the axis, cylindrical, with numerous scattered rhizoids, smooth inside; calyptra fleshy, covering the whole of the sporophyte except the foot and bearing the unfertilized archegonia at its base: ♂ inflorescence intercalary on a stem or leading branch; bracts similar to the leaves but often with a small tooth-like or sac-like lobe at antical base; paraphyses (when present) in the form of minute filamentous or subulate hairs; bracteoles similar to the underleaves: young sporophyte of the ordinary jungermanniaceous type, divided into capsule, stalk and foot, the last being bluntly conical and extending around the base of the stalk as a narrow collar; mature capsule unknown.

8. MESOPTYCHIA SAHLBERGII, (Lindb. & Arnell).

Jungermannia Sahlbergii, Lindb. & Arnell, *l. c.* 40.

Lophozia Sahlbergii, Schiffn. *l. c.* 85.

Robust, brownish-green or reddish, growing in loose tufts: stems slightly flattened, 0.8 mm. wide, 0.4 mm. thick

on well developed individuals : rhizoids yellowish to reddish : leaves imbricated, obliquely inserted, widely spreading, very broadly orbicular, 1.9 mm. long, 3 mm. wide, antical lobe often a little smaller than the postical, broadly ovate, slightly decurrent, antical margin rounded, apex rounded to subacute, usually terminating in an apiculum consisting of a row of from one to four cells ; sinus (in explanate leaves) varying from obtuse to broadly and shallowly lunulate or truncate ; postical lobe orbicular, postical margin rounded, sometimes subcordate at base, more rarely short-decurrent, apex rounded to obtuse, sometimes apiculate ; margin repand, indistinctly crenulate from projecting cells, sometimes bearing one or two short teeth at about the middle of the antical lobe or near the postical base ; leaf-cells at the edge of leaf 0.025 x 0.021 mm., in the middle isodiametric, averaging 0.031 mm., slightly elongated at the base, trigones slightly bulging into cell-cavities ; verruculæ of cuticle densely crowded, oval or circular in outline : underleaves with lanceolate or subulate long-attenuate divisions, each 1.4 mm. long, 0.17 mm. wide; marginal cilia six to fifteen on each division, mostly two to twenty cells long and one to five cells wide at base ; cells of underleaf with more uniformly thickened walls than in leaf, trigones indistinct, cuticle verruculose : inflorescence dioicous; ♀ bracts alternate in about three pairs, the innermost quadrate, 2 mm. long, with sharper lobes than in the leaves, both antical and postical commonly apiculate, marginal teeth more usual than on ordinary leaves: innermost bracteole often torn in two and carried down by the developing perigynium ; perianth ovate in outline, 2 7 mm. long, 1.4 mm. in diameter, one cell thick, irregulariy lobed at the contracted mouth, the lobes short-ciliate on their margins with cilia from one to four cells long and one cell broad throughout ; perigynium cylindrical, hollow, rounded at the apex, 3 mm. long, 1.4 mm. in diameter, the wall about ten cells thick (0.25 mm.), somewhat thinner toward junction with perianth : calyptra about five cells thick (0.15 mm.) over capsule, thicker in lower part; archegonia usually ten to sixteen : antheridia few in the axil of each ♂ bract. (*Plate I.*)

Hunker Creek (51, 57); Dawson (Williams), not listed by Howe. New to America. Previously recorded from Siberia only. The Yukon material has been compared with Siberian specimens kindly communicated by Dr. Arnell.

The genus *Mesoptychia* is allied to *Lophozia* and also to *Acrobolbus*, both of which have succubous, alternate and variously lobate leaves. It is distinguished from the first of these genera by the possession of a perigynium and from the second by the possession of a perianth. The perigynium of *Mesoptychia* is further distinguished from that of *Acrobolbus* by being hollow and by carrying down with it, as it develops, the unfertilized archegonia. The occurrence of both perianth and saccate perigynium in the same plant is a most remarkable feature but is not entirely unique, for we find it duplicated in *Arnellia*. In this genus, however, the leaves although succubous are undivided and opposite, coalescing in pairs at their antical bases, and the underleaves are simple. In the genus *Gyrothyra* as well as in *Nardia hæmatosticta* and the allied *N. Breidleri*, we also find a certain approach to the condition described for *Mesoptychia*. In these plants the end of the female branch becomes fleshy after fertilization and forms an erect perigynium, which encloses the developing sporophyte. On the outside of this fleshy perigynium are borne the perichætial bracts and at its mouth the rudimentary perianth. The lower part of the perigynium extends downward as a small solid bulbous enlargement, into which the foot of the sporophyte penetrate more or less deeply. In *Gyrothyra* the unfertilized archegonia remain near the mouth of the perigynium, somewhat as in *Acrobolbus*, while in the two species of *Nardia* they are found at the bottom. The most essential difference between the three plants just discussed and *Mesoptychia* lies in the fact that their perigynia are erect, growing upward at right angles to the fruiting axis, while in *Mesoptychia* they are pendent and grow downward. There are of course many other differences drawn from purely vegetative characters.

As in other saccate genera, the development of the perigynium in *Mesoptychia* is dependent upon fertilization. The

perianth, on the other hand, is found whether fertilization has taken place or not. So far as observed, innovations are never produced where fertilization has occurred. The leaves of *M. Sahlbergii* exhibit considerable variation but the antical lobe is almost invariably sharper and a little smaller than the postical; in the perichætial bracts, however, this difference tends to disappear.

9. LOPHOZIA RUTHEANA, (Limpr.) M. A. Howe, Bull. New York Bot. Garden, 2^6 : 102. 1901. (*Plate II.*)

Bonanza Creek (14), also collected by Williams at the same locality; Hunker Creek (46). These are the only known American stations, but the range of the species extends through northern Europe into Siberia.

Two very full descriptions of *L. Rutheana* have already been published, the first being Limpricht's original description,[1] the second Lindberg's description of his *Jungermannia lophocoleoides*,[2] which is now acknowledged to be a synonym of *L. Rutheana*. At the same time the species resembles *Mesoptychia Sahlbergii* so closely, especially when sterile, that it may be well to emphasize the more important differential characters. Of course fruiting specimens are very distinct, and, even in the case of sexual individuals where fertilization has not taken place, the paroicous inflorescence of *L. Rutheana* and the dioicous inflorescence of the *Mesoptychia* may usually be demonstrated without much trouble.

The two species are of about the same size and they resemble each other in color. Both species, moreover, have bifid leaves and conspicuous underleaves and both show distinct trigones in their leaf-cells and a strongly verruculose cuticle. In *L. Rutheana*, however, the leaves are not folded and are sometimes gibbous at the bottom of the sinus. The apices of the lobes are very variable, being sometimes rounded, sometimes obtuse and sometimes acute, but they are rarely or never distinctly apiculate. If there is any inequality in the size of the lobes or any difference in their

[1] Jahresb. Schles. Gesell. vaterl. Cultur, 61 : 207. 1884.

[2] Lindb. & Arnell, Kongl. Sv. Vet. Akad. Handl. 23^5 : 41. 1887.

apices, it is the postical lobe which is smaller and more sharply pointed, just the opposite of what we find in *Mesoptychia Sahlbergii*. The leaf-cells of *L. Rutheana* average 0.023 x 0.032 mm. at the margin of the leaf, 0.055 x 0.030 mm. in the middle and 0.055 x 0.039 mm. near the base. They are therefore a little larger than in the *Mesoptychia* and are more distinctly elongated in the median and basal portions of the leaf. The trigones of the two species are similar, but the verruculæ the cuticle of *L. Rutheana* are fusiform in shape, rather than oval or circular, and lend the leaf-surface a distinctly striated appearance. The underleaves of *L. Rutheana* are much more variable than in *Mesoptychia Sahlbergii*. They are occasionally bifid but are more commonly trifid to quinquefid with the median division distinctly larger than the others. The divisions are lanceolate and end in long filiform points which are commonly curved in various ways. In some cases one or more of the divisions arise from the surface at the base of the underleaf instead of from the margin. The divisions are often sparingly ciliate, but each one rarely shows more than a half dozen cilia and the latter are shorter and broader than in the *Mesoptychia*.

The perichætial bracts of *L. Rutheana* are broader than long, measuring 2.5 x 3 mm., and commonly show obtuse lobes. The perianth is very large, measuring when mature 5 mm. in length and 1.4 mm. in diameter; its wall is three to five cells thick (0.14 mm.) at the base, two cells thick to about the middle and one cell thick in the upper part. The perianth is gradually narrowed above the middle but is not distinctly beaked nor contracted at the mouth. The latter is minutely setulose, the thick-walled setulæ being two cells long or less. With respect to the folds of the perianth descriptions vary. Lindberg states that it is obtusely trigonous, the third keel being postical, but asserts that while young it is often laterally compressed. Limpricht emphasizes the lateral compression and adds that there is sometimes a shallow groove down one lateral face and a corresponding low ridge down the other, sometimes a groove on each face. He also states that a trigonous perianth with the third keel antical is of occa-

sional but rare occurrence. According to my own experience the compressed perianth is a very constant feature of the species. The perigonial bracteoles of *L. Rutheana* are sometimes, but not always, shorter than the ordinary underleaves.

10 LOPHOZIA KAURINI, (Limpr.) Steph. Bull. de l'Herb. Boissier, II. 1 : 1147. 1901.

Jungermannia Hornschuchiana paroica, Ekstrand, Bot. Notis. 1879 : 36.

Jungermannia (*Lophozia*) *Kaurini*, Limpr. Jahresb. Schles. Gesell. vaterl. Cultur, 61 : 204. 1884.

Jungermannia Muelleri, forma *paroica*, Bernet, Cat. Hép. Sud-Ouest de la Suisse, etc. 68. *Pl. 3*. 1888.

Hunker Creek (44 *p.p.*, 49, 63). New to America. Previously known from Norway, Switzerland and Siberia.

Limpricht's description of *L. Kaurini* and the beautiful figures published by M. Bernet give so clear an idea of the species that only its more important characters will be alluded to here. It agrees with *L. Rutheana* in its paroicous inflorescence, in its bifid leaves and in the possession of underleaves. It is, however, less robust and shows little or no trace of purplish or reddish coloration. The lobes of its leaves are rounded to acute and on slender shoots are not infrequently apiculate ; the sinus is broad, varying from obtuse to lunulate. According to Limpricht obtuse or rounded lobes are to be regarded as the more typical, but acute lobes are about as frequent in the Yukon material. In most cases the lobes are subequal in size, but sometimes the postical lobe is slightly the larger and in such cases tends to be blunter also. The leaf-cells are somewhat smaller than in *L. Rutheana*, averaging 0.035 x 0.025 mm. in the middle of the leaf ; the trigones also are less conspicuous, but the cuticle is similarly striate-verruculose. The underleaves are small and are commonly undivided ; they vary from subulate to lanceolate and end in a long attenuate point. Sometimes an underleaf will bear one or two short marginal teeth or occasionally a longer tooth near the base.

The perianth of *L. Kaurini* is clavate in shape and measures 3 mm. in length and 1.4 mm. in diameter. It is terete except when very young, and is abruptly contracted into a short and broad beak with a setulose mouth, the setulæ consisting of single, projecting, thin-walled cells. The character of the perianth shows that the species is related to *L. Muelleri* and its allies.

11. LOPHOZIA HETEROCOLPA, (Thed.) M. A. Howe.

Dawson (2, 6); West Dawson (8); Hunker Creek (29 *p.p.*, 44 *p.p.*, 48, 59, 67, 79, 80 *p.p.*). Also collected by Williams at Dawson. Nos. 29, 79 and 80 are a little doubtful and show an approach to *L. Muelleri* (Nees) Dumort. They are referred to *L. heterocolpa* because they are gemmiparous, and the writer would include under the same species the gemmiparous specimens referred by Howe to *Geocalyx graveolens*.

12. LOPHOZIA VENTRICOSA, (Dicks.) Dumort.

Dawson (34 *p.p.*); West Dawson (7); Indian Divide (93, 101); Hunker Creek (41, 55, 75 *p.p.*); Bonanza Creek (86 *p.p.*).

13. LOPHOZIA WENZELII, (Nees) Steph. Bull. de l'Herb. Boissier, II. 2: 35. 1902.

Jungermannia Wenzelii, Nees, Naturg. der europ. Leberm. 2: 58. 1836.

Hunker Creek (82 *p.p.*). The species is widely distributed in northern Europe and in Siberia. It is also known from Greenland, but has not before been reported from the American mainland.

14. LOPHOZIA INFLATA, (Huds.) M. A. Howe.

Hunker Creek (70).

15. LOPHOZIA FLOERKII, (Web. & Mohr) Schiffn.

Hunker Creek (76, 81).

16. LOPHOZIA BARBATA, (Schreb.) Dumort.

Klondike River bottom (Williams).

17. LOPHOZIA LYONI, (Tayl.) Steph.

Klondike (Williams); West Dawson (84); Indian

Divide (92, 94); Hunker Creek (38, 68 *p.p.*, 83); Bonanza Creek (90).

18. LOPHOZIA BINSTEADII, (Kaalaas).

Jungermannia Binsteadii, Kaalaas, Vid.-Selsk. Skrifter, 1898[9] : 9.

Dawson (34 *p.p.*); Bonanza Creek (11, 12, 22, 35). Originally described from Norwegian specimens. Recently recorded from Greenland. Determination confirmed by C. Jensen.

The species is close to *L. gracilis* (Schleich.) Steph. but is destitute of flagelliform branches bearing gemmæ. The walls of its leaf-cells also are much more thickened and show very conspicuous trigones. Some doubt is thrown on the validity of the species by C. Jensen,[1] who suggests that it may pass into slender forms of *L. Lyoni*.

19. LOPHOZIA INCISA, (Schrad.) Dumort.

Klondike (Williams); Hunker Creek (53 *p.p.*, 80 *p.p.*).

20. SPHENOLOBUS KUNZEANUS, (Hüben.) Steph.

Hunker Creek (74).

21. SPHENOLOBUS MICHAUXII, (Web.) Steph.

Hunker Creek (25, 53 *p.p.*).

22. SPHENOLOBUS SAXICOLUS, (Schrad.) Steph.

Klondike (Williams); Hunker Creek (54); Gold Bottom Creek (78); Indian Divide (99).

23. SPHENOLOBUS MINUTUS, (Crantz) Steph.

Dawson (Williams); Hunker Creek (26, 27, 40, 50); Bonanza Creek (102); Indian Divide (100).

24. MYLIA ANOMALA, (Hook.) S. F. Gray.

Dawson (Williams); Hunker Creek (72); Bonanza Creek (13, 18, 36).

25. LOPHOCOLEA MINOR, Nees.

Bonanza Creek (88).

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[1] Öfversigt Kongl. Vetensk. Akad. Förh. 1900[6] : 798.

26. CEPHALOZIA BICUSPIDATA, (L.) Dumort.

Bonanza Creek (15); Hunker Creek (75 *p.p.*).

27. CEPHALOZIA PLENICEPS, (Aust.) Lindb.

Hunker Creek (32, 60, 65); Bonanza Creek (89).

28. CEPHALOZIA LUNULÆFOLIA, Dumort.

Dawson (34 *p.p.*).

29. CEPHALOZIA LEUCANTHA, Spruce.

Hunker Creek (71).

30. ODONTOSCHISMA MACOUNII, (Aust.) Underw.

Dawson (Williams), listed as *O. Sphagni*; Hunker Creek (24, 52, 58, 90); Bonanza Creek (16 *p.p.*, 20 *p.p.*). Not previously collected in fruit. The species will be fully described in another connection.

31. KANTIA TRICHOMANIS, (L.) S. F. Gray.

Hunker Creek (42).

32. BLEPHAROSTOMA TRICHOPHYLLUM, (L.) Dumort.

Bonanza Creek (Williams); same locality (10, 19 *p.p.*, 21); Hunker Creek (29, 31, 33, 39, 44, 45 *p.p.*, 48, 61, 66, 73 *p.p.*); Indian Divide (95).

33. TEMNOMA SETIFORME, (Ehrh.) M. A. Howe.

Gold Bottom Creek (77).

34. PTILIDIUM CILIARE, (L.) Nees.

Dawson (Williams); Hunker Creek (28, 37, 69); Bonanza Creek (87).

35. DIPLOPHYLLEIA ALBICANS, (L.) Trevis.

Bonanza Creek (9).

36. DIPLOPHYLLEIA TAXIFOLIA, (Wahl.) Trevis.

Bonanza Creek (86 *p.p.*); Indian Divide (96, 97).

37. SCAPANIA CURTA, (Mart.) Dumort.

Bonanza Creek (19 *p.p.*); Hunker Creek (30, 43, 64 *p.p.*, 66 *p.p.*).

38. SCAPANIA UNDULATA, (L.) Dumort.

Hunker Creek (68, 82 *p.p.*).

Yale University, March, 1903.

EXPLANATION OF PLATES.

Plate I.

MESOPTYCHIA SAHLBERGII, (Lindb. & Arnell) Evans.

Fig. 1. Fruiting stem. × 12.
Fig. 2. Part of stem showing perigonial bracts and ordinary leaves, antical view. × 12.
Fig. 3. A leaf spread out. × 12.
Fig. 4. Cells from middle of leaf, one shaded to show the verruculæ on the cuticle. × 300.
Fig. 5. Underleaf. × 35.
Figs. 6, 7. Perichætial bracts. × 12.
Fig. 8. End of fruiting stem with the bracts removed, showing perianth and perigynium. × 12.
Fig. 9. Longitudinal section through same. × 16.
Fig. 10. Transverse section of perianth. × 12.
Fig. 11. Teeth from mouth of perianth. × 225.
Fig. 12. Perigonial bract. × 12.

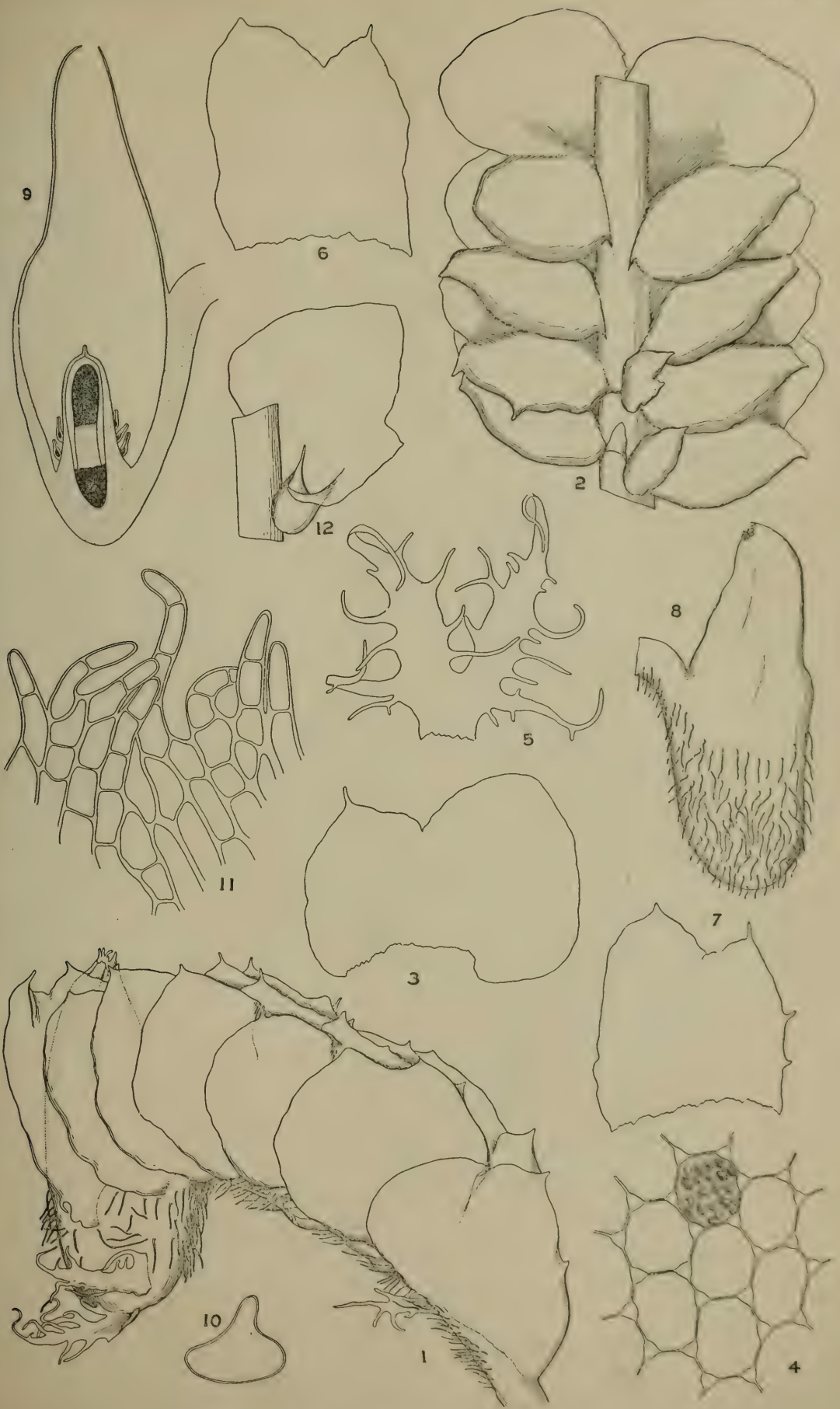
The figures were all drawn from Professor Macoun's No. 57.

Plate II.

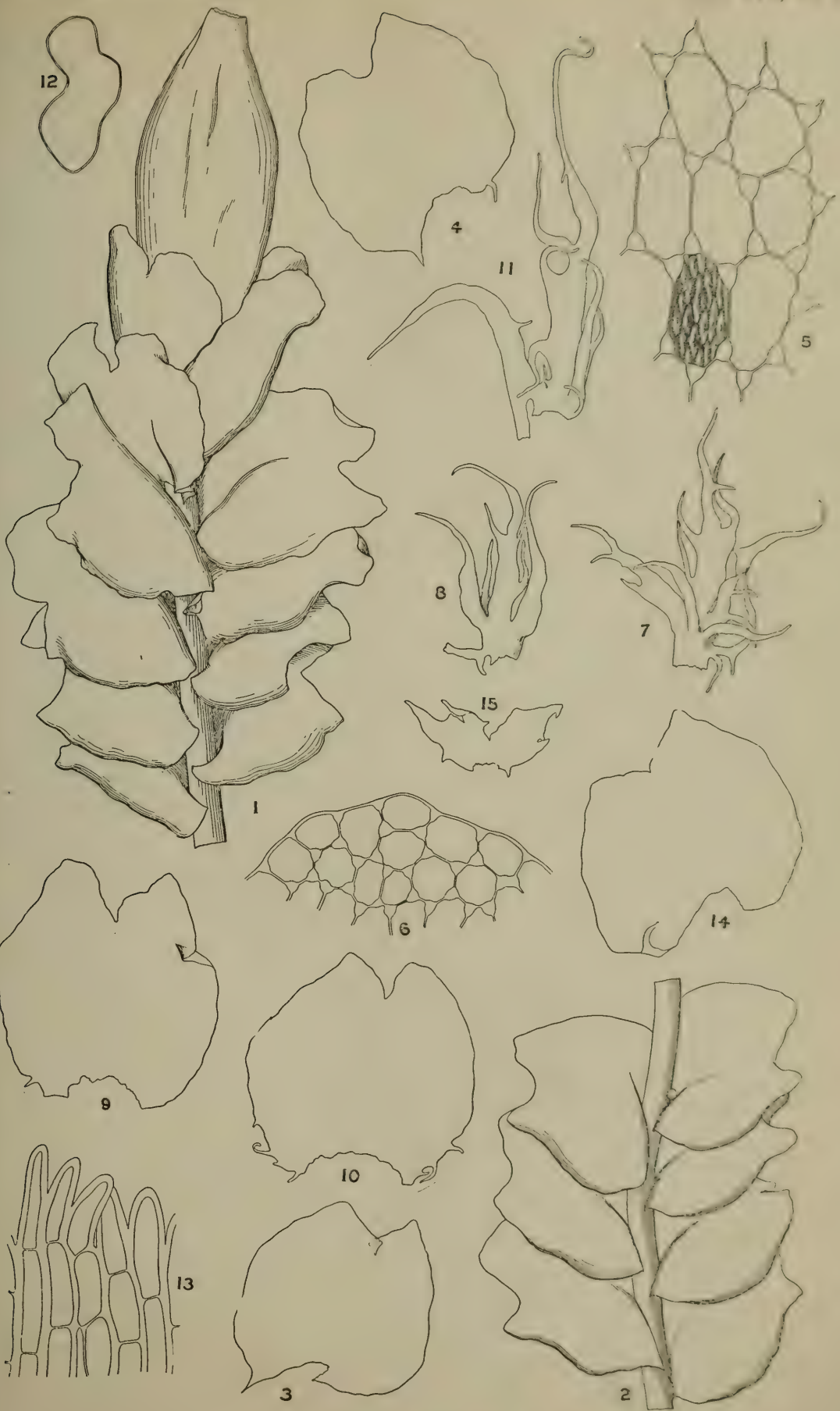
LOPHOZIA RUTHEANA, (Limpr.) M. A. Howe.

Fig. 1. Fruiting stem, antical view. × 12.
Fig. 2. Part of stem showing ordinary leaves and perigonial bract, antical view. × 12.
Figs. 3, 4. Leaves spread out. × 12.
Fig. 5. Cells from middle of leaf, one shaded to show the verruculæ on the cuticle. × 300.
Fig. 6. Cells from apex of antical lobe. × 225.
Figs. 7, 8. Underleaves. × 20.
Figs. 9, 10. Perichætial bracts. × 12.
Fig. 11. Perichætial bracteole. × 20.
Fig. 12. Transverse section of perianth. × 12.
Fig. 13. Teeth from mouth of perianth. × 225.
Fig. 14. Perigonial bract. × 12.
Fig. 15. Perigonial bracteole, more specialized than usual. × 20.

The figures were all drawn from Professor Macoun's No. 14.



Mesoptychia Sahlbergii, (Lindb. & Arnell) Evans.



Lophozia Rutheana, (Limpr.) M. A. Howe.

THE OTTAWA NATURALIST.

VOL. XVII. OTTAWA, MAY, 1903. NO. 2.

THE NESTING OF BIRDS AT THE CENTRAL EXPERIMENTAL FARM, OTTAWA.

W. T. MACOUN.

The following notes on the nesting of birds at the Central Experimental Farm are not published with the object of encouraging bird nesting at the Farm, for this is prohibited, but to show how many species of birds have been attracted there because they are protected and have found suitable nesting places. This article was written to supplement the report of the Ornithological Branch, which will also be found in this number of THE NATURALIST.

As the trees and shrubs at the Experimental Farm increase in size in the forest belts and on the ornamental grounds there is an increasing number of species of birds which breed there. In addition to that part of the Farm which is under cultivation there is a small area where the natural timber still remains, and a marsh and swamp with tamarac and willows and a few other trees. These places attract quite a number of birds which would not be found if all the Farm were under cultivation. The following observations have been made at the Farm during the past sixteen years, but particular attention was paid to the species breeding there during 1902.

Of the water and shore birds there are several which breed in the swamp and marsh near the canal. Although a nest of the American bittern has not been actually found to our knowledge, these birds are frequently seen in the marsh during the breeding season and undoubtedly breed there. A nest of the least bittern with eggs in it was found by Dr. F. A. Saunders in the summer of 1902 in the marsh. A nest of the sora or Carolina rail was

found in the marsh several years ago and it is probable that the American coot breeds there also.

Of the shore birds, the spotted sandpiper is the only species which has been found breeding on the Farm. For the past three years a pair has built in the fruit plantations, which are nearly or quite three-quarters of a mile from a pond or stream. In the years 1901 and 1902 the nest was built in the strawberrry plantation, it being placed in the row of plants and well hidden by them. In 1902 the nest was built in the middle of the orchard. The newly hatched young have been found running about in the fruit plantations. Nests have also been found on the high land in the arboretum.

None of the hawks or owls have been found breeding, though it is possible that in the Farm woods near St. Louis dam, the sharp-shinned hawk has had its nest as the nest of this bird has been found just across the canal in Dow's swamp.

The black-billed cuckoo has bred for several years in the forest belts, but in 1901 a nest with eggs was found in an apple tree in a thickly planted part of the orchard. The cuckoo does not build in the open but seeks a secluded place for its nest. It is one of the last birds to arrive and hence breeds late. Its peculiar note in early summer is often puzzling to those not familiar with the habits of the bird.

The only woodpecker which has been found breeding is the flicker. This bird is very common. A nest was found in a hollow basswood stump in the arboretum in 1902, but as the hole was only about six feet from the ground it was easily discovered by boys and robbed. This bird shows little tact in selecting a site for its nest and the large hole which it makes can be seen at a glance.

The nighthawk has been breeding on the Farm for the past fifteen or sixteen years, and several nests have been found. Many eggs must have been destroyed by the horse and cultivator, as the bird will lay its eggs where cultivation must be done. The eggs, which are two in number, are laid in the open in a shallow depression on the ground. The soil which becomes hottest seems to be preferred.

The chimney swift breeds in the chimneys of the houses and comes back regularly every year. It is very seldom that these birds are injured by fire. They do not begin nesting until the furnace fires are out, and they seem to know by instinct, perhaps by the smell of the soot, those chimneys from which smoke is likely to come during the summer and they keep away from them.

While a ruby-throated hummingbird's nest has not actually been taken on the Farm to our knowledge, we believe this bird to breed there as it is very common during the summer. A nest was taken some years ago by Mr. W. E. Saunders in the woods near the Farm.

The kingbird breeds in the orchard in the apple trees, and appears to take no trouble in hiding its nest which is readily seen. It seems to rely on its pugnacity for keeping all intruders away, and certainly it is sometimes alarming to have this little bird crying and darting about. The eggs of the kingbird are very beautiful, in fact among the most beautiful of Canadian birds. The kingbird is, we understand, fond of honey bees and it is difficult to protect its nest if the bee man finds it out.

It is possible that the phœbe has built somewhere in or about the buildings on the Farm, but a nest has never been found to our knowledge. The wood peewee also probably builds in the larger trees.

Among the first birds to arrive is the prairie horned lark, which usually appears during the latter part of February and begins breeding soon after the snow is off the ground. The nest is built on the ground, usually in the open. There must be many pairs breed on the Farm every year. A nest which was found in the arboretum a few years ago was built in the ground close to a large dandelion.

The crow remains here all the year round and is frequently seen during the winter months. It breeds early in spring in the large pine trees.

Bobolinks are fairly common in the meadows, but their nests are hard to find and few of them are seen. It is one of our finest singing birds, and it is fortunate that their nests are difficult to discover, as boys have no discrimination. The cowbird, which is closely related to the bobolink, is about as useless a bird as the

latter is valuable. What useful part this bird plays in the economy of nature is difficult to imagine. As is well known it builds no nest of its own but lays an egg here and there in the nests of other birds smaller than itself. The poor little chipping sparrow appears to be the commonest sufferer. The young cow-bird outgrows the lawful heirs of the nest and soon monopolizes it. It must keep the faithful mother busy satisfying the stomach of this voracious intruder.

The red-winged blackbird is quite common in the marsh at St. Louis dam and breeds there regularly. These birds fly over the high land well into the arboretum, probably after some kind of food.

Every year a few pairs of meadow larks breed, and as their nests are hard to find they usually rear their young. The meadow lark arrives early in the spring and its peculiar notes are readily recognized.

The Baltimore oriole is closely related to the meadow lark, but the habits of the birds are very different. As is well known, the hanging nest is built near the end of a pendulous branch and as large trees are usually chosen the nest is fairly safe from being robbed, though, we regret to say, boys with catapults sometimes play sad havoc with them. The oriole builds in the large elms at the Farm.

One of the noisiest birds is the bronzed grackle, which is also among the first arrivals in the spring. It builds in the large pine trees.

Although the purple finch does not breed in large numbers several nests have been found at the Farm. This is not a shy bird and a nest has been found within one hundred feet of one of the residences at the Farm. The white spruce appears to be the favourite tree, and the nest is built from fifteen to twenty feet from the ground. The female is quite tame when brooding, and one can approach quite close to the nest without disturbing her. A rare nest of the American goldfinch has been found late in the season and it is probable that quite a number of pairs breed at the Farm, but they breed late when few are looking for nests.

The European house sparrow is closely related to the American goldfinch. This bird begins to breed early and continues late,

and it is difficult to tell how many broods are raised in a season. The nests are built in holes, corners and cracks in the buildings.

There are probably more nests of the vesper sparrow on the Farm in one season than any other species not even excepting the house sparrow. Many nests are found every year, and many nests must be destroyed by the plough and other farm implements. The nest is built on the ground and usually has some partial protection in the form of growing grass or weeds Although no nests of the Savanna sparrow have been found to our knowledge this bird must breed on the Farm, as it is seen there during the summer. The white-throated sparrow's nest has not been found either, but this bird probably builds in the natural woods on the Farm.

There are none of the small birds which are more associated with the home than the chipping sparrow. This little fellow seems to delight in building his nest near the house and will, if possible, choose a shrub or tree almost if not quite against a building. The nest never seems to be firmly fixed to the branch on which it is resting, and there are probably more capsized chippy's nests after a rain or wind storm than any other species.

The slate-coloured junco may breed on the Farm but a nest has not been found.

The song sparrow is quite common but the nest is not as easily found as either the vesper or chipping sparrow. The nest of the vesper sparrow it found by the bird rising almost under one's feet, while the nest of the chipping sparrow is very easily seen in the shrub or tree where it builds. The song sparrow usually builds its nest in dense shrubs or on the ground, but not often in an open position, and hence it is more difficult to find, though the nests are quite common.

The swamp sparrow's nest has not been found, but it probably breeds in the swamp and marsh near St. Louis dam and the canal.

In 1895 a dicksissel spent the summer at the Farm and probably a pair were breeding in the meadow where the male bird was seen constantly for some days. This was the first and last record of this bird as it does not as a rule come to Eastern Ontario,

The only swallow which is known to breed on the Farm is the barn swallow. A few pairs breed in the barns, but the house sparrows occupy most of the available sites for nests. A pair started to build under the verandah of one of the houses in 1902 but they gave it up, though we cannot say for certain that the house sparrow was responsible for this.

During the last days of June and the beginning of July the cedar waxwings are busy breeding. This species breeds very late and is still seen in flocks during the latter part of June. The nest is very easy to find as it is built in rather open trees from six to ten feet from the ground. A Chinese maple (*Acer tataricum*, var. *Gennala*) is a popular tree, and among the many species on the grounds this appears to be preferred. It is unfortunate that this bird does not breed about two weeks earlier, as when a flock swoops down on a cherry tree or strawberry plantation a great deal of damage is done.

For the past three years, and perhaps more, the northern shrike has built regularly at the Farm. In 1902 the nest was found on May 19th, with six eggs in it, a short distance from that of 1900. The nests were found in elm trees about fifteen feet from the ground. The brood of 1900 was successfully raised by the old birds and it was an interesting sight to see the fully fledged young fighting for their food. They made a great din, the harsh notes of the old birds rising above their offspring. Some of the notes of the shrike are very pleasant to listen to while others are as bad or worse than those of the blue jay. Frequently we find grasshoppers empaled by these birds on the spurs of the fruit trees in the orchard. There has been some confusion regarding the identity of the shrike which breeds here, but it is certainly the northern shrike.

A red-eyed vireo had its nest somewhere in one of the large maples in the orchard enclosure in 1902, but the exact site was not located.

There are probably several warblers breed in the woods and swamp near the canal and St. Louis dam the nests of which have not been discovered. The nest of the yellow warbler is quite common and is readily found in the shrubbery. The Maryland

yellow-throat and American redstart both breed in the swamp near St. Louis dam.

The catbird builds every year in the thick parts of the shrubbery and is one of the most adept at hiding its nest. This is a most delightful songster and it is refreshing to hear its bold notes. It has harsh notes as well but these may be forgiven.

A pair of brown thrashers make their headquarters with us each year and usually a nest is found. One time it is in a spruce hedge and another time in a brush pile, and again at the base of a low-growing shrub. This is one of our very best songsters. Early on a May morning it will sit on the top of a tree and fill the air with its strong rich notes. It will then disappear and is rarely seen during the day.

A small box was put up by Dr. Fletcher in his back yard with a hole too small for a house sparrow to enter, the object being to induce the house wren to breed in it. He was quite successful, and for three years he has had the pleasure of watching these little fellows building their nest, rearing their young and listening to their shrill but sweet song. We hope that the house wren will become more common at the Farm.

A nest of the long-billed marsh wren was found in the marsh near the canal some years ago by Mr. A. G. Kingston, but this has been the only one taken so far as we are aware.

Of the thrush family the bluebirds and robins are all that are known to breed on the Farm, although Wilson's thrush may breed in the thicker parts of the forest belts or in the natural woods. The bluebird is not common but it seemed a little more numerous the last year or two It usually builds in a hole in the fence posts. The robin is very common and the nests are easily found. Comparatively few broods, however, seem to be reared, as between cats and boys the robin has a hard time of it. Cats may be seen stalking robins I believe at almost any hour of the day or night.

REPORT OF THE ORNITHOLOGICAL BRANCH, 1902.

(Presented and read March 17th, 1903.)

The following report is submitted by the Ornithological Branch.

We regret to state that there are so few systematic observers of birds and their habits that it is difficult to make a very voluminous report of the work which has been actually done during the past year. No species of birds new to the district were discovered, but the number found here is so limited that after more than twenty years' observations it is not to be wondered at that it is only rarely that a new bird is seen.

Notes of the arrivals of birds were again made by some of the members but these were not printed in THE NATURALIST this year. We hope, however, to soon publish a list giving the average dates of arrival of the different birds for the past five years. Thinking it might prove of interest to the Club we have looked up the dates of arrival for the past seven years of those two first harbingers of spring, the robin and the song sparrow.

Robin: 1897, March 22; 1898, March 15; 1899, April 6; 1900, April 2; 1901, March 24; 1902, March 15; 1903, March 9.

Song Sparrow: 1897, March 18; 1898, March 11; 1899, April 6th; 1900, April 1; 1901, March 24; 1902, March 15; 1903, March 13.

The dates of arrival of the prairie horned lark may also be interesting.

Prairie Horned Lark: 1897, February 22; 1898, February 18; 1899, March 15; 1900, February 14: 1901, March 1; 1902, February 27; 1903, February 15.

DESCRIPTION OF A NEW SPECIES OF MATHERIA, FROM THE TRENTON LIMESTONE AT OTTAWA.

By J. F. WHITEAVES.

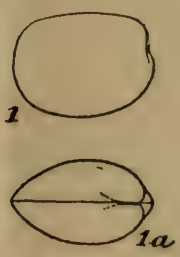
The genus *Matheria* was described by E. Billings in 1858, in the third volume of the Canadian Naturalist and Geologist. It was based upon a single species, the *M. tener* of Billings, a small lamellibranchiate or pelecypodous bivalve, from the Trenton limestone at Lake St. John, P.Q. *Matheria* appears to be most

nearly related to *Cyrtodonta* and *Vanuxemia*, and is now included in the family Cyrtodontidæ, Ulrich, of the order Prionodesmacea, Dall. The types of *M. tener*, which were collected by Mr. J. Richardson and Dr. R. Bell in 1857, at Blue Point, on Lake St. John, are still in the Museum of the Geological Survey.

A second species of this genus, from the Trenton shales of Minnesota, was described by Mr. Ulrich in 1892, under the name *M. rugosa*, in the Nineteenth Annual Report of the Geological and Natural History Survey of Minnesota. And, in his Report on the Lower Silurian Lamellibranchiata of Minnesota, published in 1897, in volume three, part two, of the Final Report on the Geology of Minnesota, Mr. Ulrich expresses the opinion that the *Modiolopsis recta* of Hall, from the Niagara limestone of Wisconsin and Illinois, is also a *Matheria*.

In the Museum of the Geological Survey there are a few specimens of a fourth and previously undescribed as well as unfigured species of this genus, from the Trenton limestone of Ottawa, collected many years ago by E. Billings and labelled by him with the manuscript name *Matheria brevis*. This species may now be defined and characterized as follows.

MATHERIA BREVIS.



Matheria brevis.—Fig. 1. Side view of the most perfect specimen collected, in outline, and showing the marginal contour of the right valve.

Fig. 1*a*. The same specimen, as seen from above, to show the amount of convexity of the closed valves.

Both of these figures are of the natural size.

Shell small, inflated and regularly convex, but not quite as wide as high, suboval or oblong subquadrate, about one-third longer than high and very inequilateral. Anterior side very short,

narrow and consisting of a small rounded lobe below the beaks, on each side ; posterior side longer, and a little wider. in the direction of its height ; posterior end vertically subtruncate at its mid-height, rounding abruptly into the cardinal margin above and into the ventral margin below. Ventral margin gently convex but curving upward more abruptly and rapidly at the posterior than at the anterior end ; superior border almost straight and nearly horizontal ; umbones depressed, anterior, very nearly but not quite terminal ; beaks incurved.

Surface markings not at all well preserved in either of the specimens collected, but apparently consisting of fine concentric lines of growth. Hinge dentition and muscular impressions unknown.

Approximate dimensions of the specimen figured : maximum length, fifteen millimetres; greatest height, eleven mm. ; maximum width, or thickness through the closed valves, nearly nine mm.

Trenton limestone, Ottawa, E. Billings : four nearly perfect but badly preserved specimens.

M. brevis can be distinguished at a glance from *M. tener*, *M. rugosa* and *M. recta*, by its comparatively short, tumid and regularly convex valves.

Ottawa, April 16th, 1903.

REPORT OF THE ZOOLOGICAL BRANCH, 1902.

To the President and Council of the
Ottawa Field-Naturalists' Club.

In submitting the usual report referring to the zoological work of the Club during the past year, it must be admitted that no very new or striking facts are available such as would give special interest or value to this annual record. Many years ago the leaders of the Zoological section pointed out that original observations on our native mammals are becoming more difficult, as the city continues to expand and the surrounding country becomes more thickly occupied, and they specified the moles, the shrews, and the smaller rodents as likely to afford the main field

for work open to resident zoologists in Ottawa. This is still largely true, and the shrews, the mice, voles and other small rodents, still invite more systematic study, with the possibility of interesting discoveries. The bats, too, are comparatively neglected, although few of our local naturalists can claim to be familiar with all the species occurring in the capital and its neighbourhood. If during the coming season a small group of enthusiasts would determine to take up such neglected branches of study as these, the zoological section of the Club would have something new and valuable to lay before the members. It is known that the white-footed mouse, the red-backed mouse, and several species of interesting field-mice are found in the Ottawa district, but actual records of specimens obtained are few and far between. A fine specimen of the Black Squirrel, from the Gatineau region, it is understood, was on exhibition on Sparks street in December, and a remarkably handsome Silver Fox from the Coulonge district has been exhibited alive in the city within the last two or three weeks. The amphibians, turtles and snakes of Ottawa require thorough investigation, and observations such as those of Mr. W. S. Odell, two or three years ago, on *Spelerpes bilineatus*, are much required. One member of the Club, Mr. Andrew Halkett, is able to record the examination of a great variety of Teleostean fishes from various localities in Ontario and Quebec. These are being preserved to form the nucleus of a new collection of fishes in connection with the Marine and Fisheries Department.

Professor Macoun handed to Mr. Halkett a specimen of the Brook or White Sucker (*Catastomus commersonii*) obtained by Mr. R. B. Whyte. Fishery Inspector Loveday also furnished a Lamprey (*Petromyzon concolor*) in the larval stage, which had already assumed the parasitic habit and had attached itself to a catfish (*Ameiurusn ebulosus*). Through the assistance of Dr. T. Bell, Algonquin Park specimens of Great Lake Trout, Yeliow Perch, Ling, Chub, Speckled Trout, etc., from the Provincial Park were obtained, while fine specimens of large-mouthed Black Bass from Port Perry, Ontario, were sent by Officer J. E. Evans, taken in Lake Scugog. Unusually large examples of the Cisco (*Coregonus artedi*) were received from Lake Erie in November, and Mr Halkett collected at Healy's Falls, Northumberland Co., Ont., Catfishes

(*Ameiurus*), Mullets or Suckers (*Catastomus*), Sun-fishes (*Lepomis*), Yellow Perch (*Perca flavescens*), Ling or Burbot (*Lota maculosa*), also Gar-pike or Bill-fish (*Lepidosteus*) and Killifishes (*Fundulus diaphanus*), in the Bay of Quinte, near Belleville. While in the Province of Nova Scotia, Mr. Halkett secured, at or near Digby, last fall, the Picked Dogfish (*Squalus acanthias*), Codfish (*Gadus callarias*), Tom-cod (*Microgadus tomcod*), Haddock (*Melanogrammus æglefinus*), Hake (*Merluccius bilinearis*) Halibut (*Hippoglossus hippoglossus*), Herring (*Clupea harengus*), Smelt (*Osmerus mordax*), Gunnel or Butterfish (*Pholis gunnellus*), also bones of the Angler or Goosefish (*Lophius piscatorius*), and the scapular bones, two vertebræ and three ribs of a Beluga or White Whale (*Delphinapterus leucas*). Finally, a small Sturgeon (*Acipenser*), and the head of a large example, were obtained in the St. Lawrence, near Lancaster, Ont.

In spite of meagre results, suitable for recording in such a report as this, there is every reason to believe that the zoologists are in various ways vigorously pursuing their favourite studies, and, if no important discoveries are made, these studies are a never-ending source of interest and enjoyment.

JOHN MACOUN,
E. E. PRINCE,
W. S. ODELL,
ANDREW HALKETT.

ENTOMOLOGICAL BRANCH.

The third meeting was held at Mr. Halkett's residence on Thursday, Feb. 12th at 8 p.m., and was opened by the host with some observations upon his very attractive collection. His object, when he began collecting, was chiefly to obtain pretty specimens, but he now recognized that such a collection should only be a stepping-stone to one of greater usefulness in which life-histories would be illustrated. After some discussion on these lines, a list was submitted by Mr. Harrington of some forty species of diptera new to the Ottawa List, and he read a short note urging the importance of the study of this order, in view of the influence of

many species, such as house-flies and mosquitoes, in propagating diseases, or in otherwise injuriously affecting the welfare of mankind. Mr. Metcalfe described experiments made in Toronto by Dr. Brodie in rearing species of Meloe, and the egg-laying habits of these beetles. Mr. Halkett asked whether any members of the Hydrocampidæ, whose larvæ are aquatic, occur at Ottawa, and in reply Dr. Fletcher stated that two species of these moths were found but not commonly. He also called attention to similar habits of the larva of *Azama obliquata*, which bores in the stems of the Cat-tail Flag (*Typha*) and can swim from one plant to another; the breathing spiracles being so high up as to be above the surface of the water. Mr. Gibson read some portions of a paper which he is preparing upon the Canadian species of the genus Apantesis (of Arctian moths) with special reference to the larvæ. Two cases were exhibited, containing representatives, generally in good series, of nearly all the recorded Canadian species, showing interesting affinities and variations. Dr. Fletcher exhibited a fine ichneumon fly, *Megaplectes Blakei*, from Cape Breton. This genus of the Cryptidæ is distinguished readily by the swollen triangular second joint of the maxillary palpi. The species in question occurs at Ottawa, and seems to be widely distributed in Canada and the United States. Mr. Young showed some living beetles which he had recently collected under bark, etc., and Mr. Harrington exhibited a series of his Buprestidæ.

The fourth meeting was held at Dr. Fletcher's house on Thursday, Feb. 26th, when a paper was read by Mr. MacLaughlin on the "Classification of the Odonata," or dragonflies. This paper was illustrated by a series of species representative of the different groups and of the principal genera. Mr. Halkett exhibited the nymph-case of a large species collected by him at Spanish River, and which was not recognized by any of the members present. The methods of collecting and preserving dragonflies were discussed and Mr. Harrington mentioned that in Japan, where these insects are very numerous, he had observed the children catching them quite easily by means of a slender bamboo tipped with a little rice-glue. Mr Metcalfe read some observations on the "Day Flight of the Male of *Callosamia Promethea*," which commenced about 4 p.m., while the females were only seen at

night. A paper by Mr. Young on the "Inflation of Larvæ" was then read and the author gave an exhibition of the skilful manner in which he prepares his beautiful and lifelike specimens. He inflated a Mamestra larva and also the hairy caterpillar of *Phragmetobia rubicundula*, pointing out that hibernated individuals were somewhat more difficult to make good skins of than the summer forms. He showed fine skins of the caterpillars of *Orgyia leucostigma*, *Ampelophaga myron*, *Phyrria umbra* and *Acronycta impressa*, and also a fine series of imagos of *Colias Eurytheme* (with larva) and a specimen of that rare little yellow butterfly, *Terias Lisa*. Dr. Fletcher showed a White Grub (*Lachnosterna* sp.) bearing the parasitic fungus *Cordiceps melolonthæ*, and Mr. Young stated that similar specimens occurred annually in his garden. Mr. Harrington exhibited a case of some of the chief insects in different orders which he had taken in Japan, and Dr. Fletcher drew attention to several new books on nature study which were upon the table, including Roberts' "Kindred of the Wild" and "Round the Camp Fire" and Long's "Fowls of the Air," etc.

W. H. H.

MEETINGS OF THE BOTANICAL BRANCH.

The first meeting of the Botanical Branch was held on the evening of February 5th, at Dr. Fletcher's house, who, as chairman for the evening, explained that the reason the meeting had been called was twofold. After discussion, the botanical leaders had decided that regular meetings of the Branch would be very useful in keeping up the interest in botany among the members, by giving an opportunity for the reading of notes and short papers and for the discussion of many matters which might not be considered of sufficient importance to bring before the general meetings of the Club; further than this, these contributions would provide valuable matter for publication in the OTTAWA NATURALIST.

Each member present was invited to express his views on the subject. All were unanimous in the opinion that such meetings would be very helpful and Mr. J. M. Macoun, the Editor of the OTTAWA NATURALIST, stated that the contributions would

be most acceptable for the monthly magazine ; for, notwithstanding the large number who apparently took an interest in plants and collected them at the excursions, notes of a botanical nature sent in for publication were very few.

Prof. Macoun gave an interesting account of some of the plants he had collected in the Yukon during the summer of 1902. Dr. Fletcher showed specimens of interesting plants he had collected in south-western Alberta, and drew attention to several, the finding of which on this side of the Rocky Mountains was unexpected.

Dr. Ami introduced the matter of dividing the Ottawa district into floral areas for convenience of reference. When these would be definitely decided upon, the distribution of the rarer species could be plotted on the geological map of which the Club has a large supply.

Mr. A. E. Attwood was requested to act as recording-secretary for the meetings and to keep minutes of the discussions.

The second meeting was held at the house of Prof. Macoun, on the 23rd February. The chairman, Prof. Macoun, exhibited a complete collection of the Carices and Antennarias, of Ottawa, and at the same time pointed out the most obvious differences between the various species.

The remainder of the evening was spent in discussing the best method for the systematic prosecution of botanical work in this district.

J. F.

The third meeting was held, March 23rd, at the residence of Mr. J. M. Macoun.

Dr. Fletcher exhibited a plug taken from a drain-tile which had been completely filled with willow rootlets, a branch of the root having effected an entrance at the junction of two tiles. A short discussion on willow hedges followed.

Mr. W. T. Macoun showed a section of a cherry-tree that had been girdled by mice. Above the girdle the diameter was over ½ inch greater than below. The specimen was a natural demonstration of the deposition of woody material formed from food stored

during the previous season and elaborated in the following spring. The girdle made it impossible for sap from below to ascend.

Mr. J. M. Macoun showed specimens of *Aquilegia Canadensis* and *A. coccinea* and expressed the opinion that the latter would be found in the Ottawa district. The ripened fruit is the best distinguishing feature of the two species. On *A. Canadensis* the follicles have spreading tips while in *A. coccinea* the follicles are straight and about ⅓ longer. The flowers of *A. coccinea* are much larger than those of *A. Canadensis* and the spur is twice as long. Specimens of *Spiræa latifolia* were also exhibited which showed this species to be quite distinct from *S. salicifolia*; both species are found near Ottawa. The crucial test of a species was, after some discussion, decided to be the continuous reproduction, without variation, of plants from seed.

Prof. Macoun strongly recommended more specialized work on the part of the members and several expressed their willingness to assume responsibility in particular phases of botanical work: Dr. Fletcher, Violets and Carices; Prof. Macoun Fungi; Dr. Guillet, Phenological observations: T. E. Clarke, Ferns of the Ottawa district; W. T. Macoun, Shrubs, with special reference to the genus *Spiræa*; A. E. Attwood, Trees and noxious weeds.

The fourth meeting was held at the residence of A. E. Attwood.

A number of twigs of shrubs and trees were identified and discussed. It was demonstrated that with a little study and care, trees can be determined as readily from twigs and buds as from flowers and fruits.

Dr. Fletcher read an interesting article from "Science" on the effect upon animals of eating "Sleepy Grass." He also spoke of the serious mechanical injury caused to the stomachs of sheep by their eating of the so-called prairie crocus (*Pulsatilla hirsutissima*). This anemone is the first green thing found on the prairies in spring and is freely eaten by sheep. The hairs of the leaves and stem are indigestible and become felted together in the animal's stomach frequently causing death.

The remainder of the evening was spent in listing the localities at which the different species of orchids growing in this region had been found.

The fifth meeting was at the residence of Dr. H. M. Ami. The most important item of business was the settling of the division of the Ottawa district with the view of better describing the localities in which plants are to be found. The *Flora Ottawaensis* is at present receiving considerable systematic attention, with the object of publishing a revised list of the species to be found in the Ottawa district. In order to facilitate the recording of localities, the four geographical divisions of the district are henceforth to be recognized by names.

The Ottawa River naturally separates the Quebec area from the Ontario area. Each is divided into west and east divisions by the Gatineau River and the Rideau River respectively. In the near future these divisions will probably be subdivided into sections, but it was thought wise to go no further at present than the first step, which may be indicated as follows :

The Ottawa District.
- A.—The Quebec Area.
  - 1. Quebec West ; 2. Quebec East.
- B.—The Ontario Area.
  - 3. Ontario West ; 4. Ontario East.

Dr. Ami announced that he was preparing a map that will indicate the nature of the surface of the land of the Ottawa district.

Several interesting specimens were brought by Dr. Fletcher, among them ;

(1) A tuft of sweet grass (*Hierochloa borealis*) in flower. It came from the Experimental Farm, but is to be found growing wild at the Beaver Meadow and near Lake Flora, Hull. This grass is employed by Indians in making baskets, table mats, etc.

(2.) Vegetable concretions or nodules from Nova Scotia. These were several inches in diameter and almost spherical in shape. They had been formed by the matting or felting together of small pieces of grass, ferns, and pine leaves through the action of water in a pool at the foot of a small waterfall on a rivulet.

(3.) Galls from the roots of rose-bushes. This gall is found on native species and has also attacked a Japanese rose at the Experimental Farm.

(4.) Radishes in various stages of development. Their interest lay in the interpretation of the scale-like appendage adhering to the enlarged stem. It proved to be a remnant of the ruptured sheath of the radicle.

A. E. A.

SUB-EXCURSIONS.

About fifty members and friends of the club met at St. Patrick street bridge on Saturday afternoon April 11th. The leaders present were Professor John Macoun, W. T. Macoun, Andrew Halkett, A. E. Attwood and W. J. Wilson. The party proceeded to Beechwood and McKay Lake collecting plants, animals and rock specimens by the way. The plants found in bloom were *Anemone Hepatica*, *A. acutiloba*, spring beauty, *Claytonia Caroliniana* and blue cohosh (*Caulophyllum thalictroides*). The three first named were found in considerable abundance. Attention was directed to the rock formations as shown on the map of the Ottawa district. In going from St. Patrick street bridge the Utica shale outcrops in numerous places and is seen up to the first road leading into Beechwood. Then by a fault the chazy limestone comes up on the left and a narrow band of Black River limestone on the right. About half way from Beechwood gate to McKay Lake chazy shale appears, and this is the surface rock to the river where it is well seen at Rockliffe. The pleistocene formation round McKay Lake is of much interest. The water in this lake was at one time at least twenty-five feet higher than at present, and was then held in by a deposit of Leda clay through which the small stream which drains it has slowly cut a deep channel to the Ottawa River. All along the eastern shore there are large deposits of shell-marl, composed chiefly of fresh water species, many of which are now living in the lake. Under these deposits are beds of stratified sand and clay which hold marine shells, though we were not fortunate in finding any specimens of these on Saturday. In a sand pit recently opened there is a splendid section of the stratified material. The lower part is very irregular and shows false bedding, while the upper part is in horizontal layers.

At five o'clock the company assembled on a hill overlooking the lake and listened to short talks by some of the leaders on the specimens collected during the afternoon. Professor Macoun spoke on the plants and pointed out many interesting facts about the trees growing close by as to their mode of growth, branching, etc. Mr. Andrew Halkett showed a number of Zoological speci-

mens and explained their structure and habits, and the President, Mr. W. T. Macoun, spoke of the birds seen.

In addition to the plants mentioned above Mr. J. M. Macoun reports that he found the dogs-toothed violet (*Erythronium Americanum*) and *Trillium grandiflorum* in bloom at Kingsmere on the same date.

W. J. W.

The second sub-excursion of the Club for this season was to Blueberry Point, near Aylmer, P.Q., on April 18th, when about fifty members and others attended. The day was fine but cool, although in the woods it was very pleasant. While there was little growth in the woods the trailing arbutus and hepaticas were in full bloom, and large quantities of the former were gathered. There were few other species, however, in flower in the woods at the point. A number of trees of the Banksian pine (*Pinus Banksiana*) which is rather rare near Ottawa, were noticed on the point. The red bellied snake, *Storeria occipitomaculata*, was found to be quite common under the stones in the woods, and one specimen of the grass snake was also procured. Two species of newts were taken. Few birds were seen, and none of special interest. The geologists and entomologists obtained some interesting specimens. Before returning to the city short addresses were given by Dr. James Fletcher, Dr. H. M. Ami, Mr. Andrew Halkett and the Rev. Mr. Bland on the specimens which were obtained and on other natural history topics. It was a pleasure to the president and leaders to find so many young people interested. One boy was noticed kissing a snake, and a young lady was persuaded to stroke one. If no other good came of this excursion than the convincing of the young people, and older ones as well, that these little creatures are perfectly harmless and should be protected and not killed, the Club was well repaid for having this outing.

W. T. M.

The sub-excursion to Rideau Park, better known as "Billings' Bush," April 25th. was the most largely attended of the season. More than one hundred Normal School students and about fifty members of the Club met at Billings' Bridge and guided by the

leaders in the several branches of the Club's work entered the woods from the west and spent nearly two hours in collecting and studying plants, insects and birds. The leaders present were: Geology, Mr. W. J. Wilson; Botany, Messrs. J. M. Macoun, A. E. Attwood and S. B. Sinclair, Entomology, Messrs James Fletcher, C. H. Young and A. Gibson; Ornithology, Prof. John Macoun and Miss Harmer; Zoology, Mr. Andrew Halkett. The number of species of plants in flower was not great and the attention of the majority of those present was devoted to the study of trees and shrubs, and the characters by which they may be identified by the twigs and buds. Several interesting insects were collected and identified.

About five o'clock the entire company gathered near the northeast corner of the wood where a convenient pile of logs afforded comfortable seats for the ladies. The president, Mr. W. T. Macoun, was the first speaker, and described briefly the characters by which the various trees could be identified from their twigs. He was followed by Prof. Macoun who in a characteristic speech impressed upon the students the necessity of a basis of definite knowledge upon which to build in studying Natural History. Each fact as acquired would then naturally fit itself into its proper niche, and as the years went on a vast amount of valuable knowledge would be accumulated. Dr. Sinclair's announcement that Nature Study was to be given a more prominent place in the Public School curriculum was received with applause. He pointed out briefly the advantages of such study and said that public school teachers would now be trained so that they would be equipped with all the knowledge necessary to teach children to understand what they saw and heard when in the woods and fields. Dr. Fletcher was the last speaker, and taking for his text a handful of specimens he described their chief characteristics and uses. The great variety of material collected was not apparent until student after student came forward with some specimen different from what anyone else had seen.

The excursion was one of the most successful and enjoyable ever held under the auspices of the Club.

NATURE STUDY—No. I.

By JAMES FLETCHER, Ottawa.

There is probably no subject which has so suddenly taken hold of the minds of educators, particularly during the last five years, as that which is now known in North America under the name of Nature Study.

It has been decided by the Publishing Committee, with the permission of the Editor, that a continuous series of articles upon the common objects of the country should appear this year in THE OTTAWA NATURALIST. It is believed that such articles will be found of value and interest both to our general readers and also to the many teachers and students who read the monthly magazine and attend our excursions. The Ottawa Field-Naturalists' Club is essentially an educational institution, and the officers are always anxious to make use of every opportunity of widening its scope of usefulness.

Much has been done in the schools of Ottawa by prominent members of the Club to foster a love for Nature. Mr. William Scott, now of Toronto, Dr. Sinclair and Mr. Putman, of the Ottawa Normal School, have always appreciated the great value of Nature Study in the science of teaching. Miss Bolton, Mr. D. A. Campbell, Miss Harmon and Miss Lee, Mrs. Ross, Miss Matthews, as well as Mr. Attwood and particularly Dr. Guillet, all of them experienced teachers, have recently made a special feature of stimulating an interest in school work of all kinds by using the attractiveness of natural objects to create a studious habit. Some of our leading newspapers, having recognized the trend of public opinion, have made arrangements for a special department of Nature Study in their columns. A series entitled "In Field and Wood" has already been begun in the *Mail and Empire*.

Nor have the educators in other parts of Canada lagged behind in adopting this important means of arousing interest, enthusiasm, and appplication among the boys and girls who are being trained to be her citizens of the future. In every Province of the Dominion something has been done or some provision has

been made in the public schools for imparting to the pupils as part of their regular instruction some knowledge of the common objects which surround them on every side, and this has been found successful to a marked egree in stirring up that interest in all their school studies, which is so essential to advancement.

In education, no progress can be made until an interest is aroused in the subject taught, and nature study, above all things, stimulates mental activity. Its very essence is a spirit of enquiry and a desire for knowledge--to want to know about everything seen, what it is, why it is there, how it got there, and what are its uses. A thirst for knowledge is an instinct, too, which can be cultivated and developed to a wonderful degree. An illustration of the practical value of these studies is to be found in the North-West Territories and Manitoba, where remarkable results are now very apparent in the improved condition of the whole country as a direct outcome of the simple instructions on plant life (illustrated by the commonest plants found in each locality), which have been given in the rural schools during the past five or six years. This has been in connection with the vigorous campaigns which are being annually waged against noxious weeds. Good work has also been done by teaching the boys and girls of the country what is the true nature of hawks and other birds of prey, and how important a part they play as friends and not, as is generally supposed, as enemies of the farmer.

The usefulness of nature study has been recognized not only by the teaching profession, who are making use of it in schools, but also by those important educational institutions, the Exhibition and Fair Associations, which have done much, by offering small prizes, to draw the attention of farmers and their children to the value of a knowledge of the common, beneficial, and injurious plants, insects, birds, and animals of the country.

Let us then consider briefly what Nature Study is. Prof. Bailey, of Cornell University, one of the best known leaders in this work, says that it is "training the eye to see correctly what it looks at, and the mind to draw the right conclusions from what is seen." It is, in fact, a means of bringing about an equal and simultaneous working of each one of our senses—sight, hearing, taste, smell, and touch—with our minds, by which the perceptions

are brightened to a wonderful degree and the individual becomes more alert, self-reliant, and useful. Nature study, to be successful and take its most useful place in education must deal with the beginnings of things. It imparts an elementary knowledge of all the commonest things about us, which, from their very commonness, are of importance to us, because they touch us so frequently and enter so much into our everyday lives. Nature study is particularly suitable for training the young – even the lowest grades of scholars—whose senses are always keen to observe anything new or strange, and whose minds are always in a receptive state ; but, also, it equally commends itself to the observant and thoughtful student whatever his age may be. It is essentially kindergarten work, and kindergarten work is essentially nature study.

The scope of nature study, as stated, should as much as possible be confined to the simple elements of knowledge. It is simply a means to an end. Its object is not to teach any branch of natural science, but to train the mind to acquire knowledge in any direction to which it may be specially directed. It should not be taught by the teacher to the scholar, but studied by the teacher with the scholar—the teacher merely using his superior knowledge and experience in directing and encouraging the scholars to strive to learn for themselves something about all things which come before them. In this way they will become self-dependent, and will not trust blindly to what is told them or what they find in books, but they will examine, consider, and confirm everything for themselves.

Wrong ideas about many things in nature are very widespread, and there is an inexplicable lack of knowledge on the part of a large proportion of the community with regard to many things concerning which some easily obtainable information would be of great benefit to them. All the foolish things, and nearly all the wicked things done in the world, are due to people not knowing many simple things which they ought to know. There is, perhaps, no such widespread and unnecessary cause of unhappiness or actual misery as the fear of being in the dark, which is felt by so many children, and even by many grown-up people, and, yet, if one will only think the matter out carefully, he will have to acknowledge that it is an almost unheard-of thing in Canada for any injury to

happen to anyone in the dark which is not liable to occur in daylight. If children were made to understand this by giving them definite information concerning the imagined sources of danger, how many pangs of anguish would be spared!

Inaccurate statements about animals, birds, insects and reptiles are the cause of much unfounded fear, which not only produces unhappiness, but prevents the doing of important duties or the performance of many kind acts. How much happier many would be, were they convinced of the fact that such a thing as a true record of an actual instance of a wolf attacking a human being in North America is unknown, notwithstanding the statements to the contrary, which frequently appear in the press and in books on natural history! Just as inaccurate are the accounts of supposed injuries by spiders, which are generally but falsely accused of biting children. Many other inoffensive insects, such as caterpillars, dragonflies and beetles are dreaded, and too frequently ignorantly destroyed as deadly enemies of the human race, which have no possible power to do us any harm.

Again, reptiles of all kinds are as a rule very much dreaded, but, except in the few localities where rattlesnakes occur, we have no venomous reptiles in Canada. In fact, it may be truly said that, if we leave out of consideration mosquitoes and a few other flies, there is practically no wild reptile, beast, bird or insect in our woods which will or even can do us any harm.

Nature study will do away with a vast amount of this lack of knowledge, and to a large degree will increase the happiness and contentment of those who are drawn to nature for solace, recreation and rest, and are thus enticed into the leafy woods and dewy fields to study the many beautiful, fascinating and instructive objects there to be found.

THE OTTAWA NATURALIST.

VOL. XVII. OTTAWA, JUNE, 1903. No. 3.

THE BEETLES OF AN OREGON BEACH.

By H. F. WICKHAM, Iowa City, Iowa, U.S.

If one looks through the annals of Entomology, he will find the sea coast of Oregon rarely mentioned. If now he will turn to a map, he will see the reason, for the railroads seem to have avoided the district to a remarkable extent, so that it is not to be reached with the same ease as corresponding regions in the other Pacific States. In fact, there are only two ports on the entire Oregon coast that are connected with the great north and south trunk line—namely Astoria, at the south of the Columbia, which has rail connections with Portland, and Yaquina, on a bay of the same name, about 100 miles farther south, reached from Corvallis or Albany by a line through the intervening mountains.

While Yaquina Bay is not of much importance to the world at large, it has nevertheless quite an extended reputation in Oregon, on account of the fine beach at Newport, a small village which owes its prosperity to attractions as a summer resort. The ride from Albany takes several hours, though the distance to be travelled is but about a hundred miles. However, the trip is a pleasant one, the hill scenery being pretty, if not exactly grand. Unfortunately, much of the original coniferous forest has been burnt off along the line, though there is enough left to show that the growth must have been a heavy one. Live oaks are a prominent feature of the flora, and in places form considerable groves.

At the head of the bay lies Toledo, too far from the beach to answer as headquarters for one intending to collect, for the shores in the immediate vicinity are extremely muddy and uninviting.

The bluffs approach them closely, and the intervening flats are largely salt marsh. A few miles farther down is Yaquina, once a thriving seaport, but now a very poor community. This is the terminus of the railroad, and, as it is not far from the open coast and furnishes fair accommodations, I made it my stopping place. The village lies mostly on a narrow mud flat, nearly all of the houses being built on piles, so that during high tide the occupants can look out of their windows into the water, while at low tide they have a vista of mud spread before their eyes.

In the immediate vicinity of Yaquina are ranges of hills, covered with a growth of coniferous and other timber, badly damaged from fires. Of the fauna of this district it is not my intention to write, since it partakes of the ordinary nature of such locations on the north coast. The beach proper is near Newport, which lies at the south of the bay, and can be reached from Yaquina by a steamboat, making daily trips, or by a walk of a few miles along the shore when the tide permits. My general plan was to go over on the steamer and walk back, as this gave me a longer day than I could get in any other way. The beaches are several miles in length and are backed by great bluffs which come within a few rods of the water's edge, their faces precipitous for the most part, except where the drifting sand has modified the contour. The highlands back from the bluffs are extremely sandy and covered with a growth of dense scrub, with open patches here and there. In the distance are groves of conifers.

A number of small springs ooze from the face of the bluffs and trickle for some distance over the sands at the base. Many species of beetles favor just such spots, which offer, in consequence, a fine field for the collector. *Cicindela oregona* runs and flies about these damp sands, in company with one of the forms of *Bembidium littorale*. By overturning small pieces of wood and other rubbish, I took quite a series of *Omophron ovale*, *Bembidium transversale* and *Nebria diversa*, the last named being a rather uncommon species in collections and differing by its curious pale color from most of our other *Nebriæ*. Where the water had spread out a good deal, I found a rather large *Dyschirius* in some abundance, either running about in the sunshine or burrowing under the sand among the runways of *Bledius ornatus*. I saw on

one occasion a *Bembidium littorale* carrying off a *Dyschirius* and a *Bledius*, but did not succeed in finding out whether the Carabidæ had hold of the Staphylinid or whether the *Bledius* had been seized by the *Dyschirius* which in its turn had been attacked by the *Bembidium*. I think the former alternative the more likely, as the soft tissues of *Bledius* render it especially liable to the attacks of stronger beetles, and in some spots, where it occurred in thousands, the *Dyschirius* might be seen preying on it extensively.

Where the beach was simply moist rather than wet, one might get nice series of *Phycocætes testaceus* under logs, in company with *Elassoptes marinus*. Both of these weevils are commonly found in colonies where they occur at all, the former, however, being perhaps more partial to the shelter of bunches of cast-up seaweed. These masses of algæ also served as refuge for numbers of *Cercyon fimbriatum*, *Cafius canescens* and *Saprinus bigemmeus*. Back in the dry sand dunes, one might sit and scoop out the side of a hillock, and, as the grains sifted down, out would fall the Tenebrionidæ that frequent them—the common forms being *Cælus ciliatus*, *Phalergia globosa* and a species of *Eleodes*. *Sinodendron rugosum* and *Ceruchus striatus* were dug from beneath half-buried logs.

When the wind is in the right quarter, the collector may always find some good things cast up by the waves ; but, as these are usually species of at least fairly strong flight, I was surprised to find drowned specimens of *Omus dejeanii* and *O. audouinii* at the water's edge. A number of *Buprestis langii* were thrown ashore, but one had to get them quickly if it were intended to make use of them for the cabinet, as the bodies were immediately attacked by small crustaceans and soon reduced to mere shells. *Leptura tibialis* and *L. matthewsii* were occasionally noticed flying over the beaches, but I could not ascertain whence they came. *Cicindela bellissima* was quite abundant, chiefly on the very fine dry drifted sand close to the base of the bluffs, and, being only moderately shy, was readily captured by working up from leeward. I find a pair of *Copidita quadrimaculata* among my collections from this vicinity, but there seems to be no record in my notes as to the circumstance of capture. However, I have found the same insect in great numbers at San Francisco, under pieces

of wood, paper, cloth or other rubbish, just far enough from the beach to keep dry

The ocean face of the bluffs was quite steep in most places, but where it could be readily ascended I made a search for beetles, without finding a large number of species. The best insect I managed to get, was a small one—*Adranes taylori*, a blind Pselaphid, of which I took a few in the galleries of a small ant. Fortunately, I happened on the breeding season, for the beetles were paired, walking unconcernedly among their hosts, who did not molest them in any way. This genus has only recently been found on Vancouver Island by Rev. Geo. W. Taylor, after whom the species has been named.

Looking at the collections with reference to those made at other places, one can readily see that they are in general much the same as might be formed at any point on the coast from San Francisco northward, though a number of the beetles extend their range south to the extreme limit of the United States. Still there are some that would be noteworthy captures anywhere, and it is always worth while to record the habitats of such forms, when they can be ascertained. As far as present knowledge goes, *Cicindela bellissima* is not found at any other point, and the attention of collectors who have the opportunity of visiting the country on either side of Yaquina Bay, should be turned to the task of determining the real range of this species.

MAP OF THE OTTAWA DISTRICT.

We are pleased to announce that at a recent meeting of the Council it was decided to reduce the price of the Map of Ottawa to the members of the Club. This valuable map, which will be of the greatest service to working naturalists for plotting the occurrence and distribution of species in all branches of natural history, may now be obtained from the Treasurer at the low price of 5 cents a copy for members of the Club, which is almost at cost price, and by those who are not members of the Club at 10 cents a copy.

A RED-SHOULDERED HAWK IN CAPTIVITY.

ROGER T. HEDLEY, Duncrief, Ont.

(Read before the Ornithological Branch of the Entomological Society of Canada.)

One day in October, 1901, I went out for some sport with my gun. I had not gone far when I noticed a hawk sitting on a dead branch of an elm tree. It was a good distance, but I thought I would try a shot. The first barrel only startled it; but, before it had gone far, the second shot dropped it. My dog ran to the hawk, which threw itself on its back and showed fight. I threw my coat over it, slipped a strong cord around its neck and carried it to the barn, where I placed it in a large box with a slat front. The only wound was on the left wing, and the bone had not been broken.

I placed a perch in the box for the hawk to sit on and soon it jumped up. The first thing I got for it to eat, was an English sparrow. When I threw the bird into the box, the hawk seemed frightened and did not offer to touch it till I stepped away from the box. Then it jumped down from the perch, and, having seized the sparrow with its talons and spread its wings, it marched around carrying the bird in its claws. Before commencing to eat the sparrow, it picked out the wing feathers and most of the small feathers of the body. After each mouthful of feathers, it would glance sharply around to see if anything was going to interfere. It first ate the head and then proceeded to devour the remainder. I fed it mostly on sparrows during the winter, but occasionally found a mouse, which it seemed to relish better than sparrows. My hawk soon became so tame that it would start to eat its food without waiting for one to retire. After seizing a mouse in its claws, it would pick it up with its bill, then catch it again with its claws before eating it. It always ate the head of a mouse first, and usually swallowed or tried to swallow the hind quarters along with the tail. Sometimes I have seen it stick at this last operation, when it had to pull its mouthful out again with its claws. Then it took a few bites before the tail disappeared.

After the snow went away last spring, it was an easy matter to turn over old logs or stumps near the woods and get mice for

the hawk. I have sometimes given it more mice at one time than it could eat in a day. One day it ate ten, but the next day it did not seem very anxious for food. When I hold a mouse near the box, it makes quite a fuss, and, if I throw the mouse at the hawk, it springs from its perch and never fails to catch the mouse in the air with its talons before it touches the floor.

When I captured the hawk, it was evidently in the first year's plumage. Its general colour above was dark brown ; below, its feathers were whitish, with longitudinal brown-pencilled markings. The tail was barred with whitish. It moulted this summer, and its new feathers came in of a different colour. Above, it is a reddish-brown, with the centre of the feathers darker than the outside. The bend of the wing has assumed an orange-brown tinge, and the barring of the tail is brighter coloured. The breast and lower parts are light reddish-brown with whitish barring.

At night, when it is sleeping, it takes a queer position. It curls its neck around and hides its head in the long feathers of its neck. One has to look closely at it to see the least sign of a head. Its appetite varies much with the seasons. In winter a fast of three or four days is not always sufficient even to provoke even a fairly good appetite, and a week's fast does not make it so hungry as a fast of two days in summer time.

I have often watched it in the act of ejecting a pellet of fur, feathers and bones, which is the habit of the Raptores in general. After undergoing several of those contortions of the back which afflict a human being in the act of vomiting, it shakes its head violently, and the pellet, on leaving its mouth, is often thrown many feet to one side. The pellets vary in size from 1 to 1½ inches in length and are usually about twice as long as they are thick. The ends of the pellets are generally somewhat rounded, but sometimes they have quite a sharp point. Those I have examined particularly, consist of a number of wads of about ¼ inch in thickness, and, when the hawk has been fed solely on mice, they have usually contained nothing but fur and a few small bones, sometimes so small that they are hard to find.

CURIOSITY OF A HUMMINGBIRD.

Last summer, as I was sitting in the woods behind a summer-house, making the hissing sound which Mr. Chapman recommends to attract birds, a hummingbird came to me and hovered over and flew about my head, now and then alighting a few moments, not upon me, but on some twig near by, surveying me curiously the while. Then off it darted till lost to view. But pretty soon, as I kept on making the sounds, always sitting quite still, back it came again, acting as before. The bird came and went away in this manner four times. It constantly uttered a sound very similar to the noise I was making with my lips. All this took place in a few minutes.

There were two things new to me in the behaviour of this beautiful creature: its chirping and its intelligent curiosity. I find the chirping mentioned in Mr. Saunders's interesting article on Canadian Hummingbirds in THE NATURALIST of last July. The curiosity, or rather the essentially bird-like curiosity, shown by this hummingbird, was very surprising to me, as I had been led to believe, by reading Mr. Hudson's account of the nature and habits of hummingbirds, that none but the crudest insect-like curiosity need be looked for in any hummingbird. That most charming of natural history writers, in "The Naturalist in La Plata," after noticing that hummingbirds have frequently been stated to be more like insects than birds in disposition, affirms that they are not to be compared even with the more intelligent insects, but have a much closer resemblance to the solitary wood-boring bees and to dragonflies. To support his opinion, he makes, among others, the following statements some of which are of interest in connection with Mr. Saunders's observations: "Their aimless attacks on other species approaching or passing near them, even on large birds like hawks and pigeons, is a habit they have in common with many solitary wood-boring bees. They also, like dragonflies and other insects, attack each other when they come together while feeding; and in this case their action strangely resembles that of a couple of butterflies, as they revolve about each other and rise vertically to a great height in the air. Again, like insects, they are undisturbed at the presence of man

while feeding, or even when engaged in building and incubation; and, like various solitary bees, wasps, etc., they frequently come close to a person walking or standing, to hover suspended in the air within a few inches of his face; and, if then struck at, they often, insect-like, return to circle round his head. All other birds, even those which display the least versatility, and in districts where man is seldom seen, show as much caution as curiosity in his presence; they recognize in the upright unfamiliar form a living being and a possible enemy."

So far as concerns the curiosity of the Ruby-throated Hummingbird, I am compelled, in the light of the incident mentioned above, to differ from Mr. Hudson. It seems to me that my hummingbird acted in the very way described in the last sentence quoted from him. Its actions are certainly much more comparable to those of the squirrel and the chickadee in like circumstances than to those of any insect. Who ever heard of a dragonfly or bee showing an interest in sounds, recognizing them as similar to its own and returning again and again from afar to investigate their curious source in the manner above detailed?

CEPHAS GUILLET.

March, 1903.

ENTOMOLOGY.

HAGENIUS BREVISTYLUS, Selys.

Referring to a note in THE OTTAWA NATURALIST for May last at page 37, in which it is stated that the nymph case of a large dragonfly was exhibited by me at one of the Entomological Branch meetings, and that the species was not recognizable by any of the members present, I may say that Dr. Fletcher has communicated with Professor J. G. Needham about this pupa case and also sent to him a drawing of the specimen, which has been identified as belonging to *Hagenius brevistylus*, Selys, the nymph of which is well figured in Professor Needham's valuable work on the "Aquatic Insects in the Adirondacks." (N. Y. State Museum, Bull. 47, 1901.)

A. HALKETT.

MOOSE WITH ELK ANTLERS.

(With one plate.)

By the REV. WM. A. BURMAN, Winnipeg.

The photograph accompanying these notes shows two moose heads. The normal moose antlers are to illustrate the very curious variation in the other pair, which are almost typical elk antlers.

The moose thus curiously distinguished was killed some weeks ago in the country north of Beausejour, Man., and about 60 miles north-east from Winnipeg. The head is now in the possession of Mr. Alexander Calder, taxidermist, Main street, Winnipeg, to whose courtesy I am indebted for the photograph and notes. The measurements are as follows :—

Length of head from mouth to crown	30 in.
Round the head at base of antlers	39 in.
Round the nose	24 in.
Spread of antler prongs . .	50 in.
Length of longest prongs from base	40 in.
Circumference of antler at base .	6½ in.

It would be interesting to know if such freaks as this are common. If not, then what is their significance? I have heard of a case in the far north where a moose had one antler as in this case, the other of normal shape. Does the health of an animal influence these growths? Or would environment affect them? Is it not possible that some significance, not yet discovered, lies hidden in the so-called "freaks" of nature such as this? Personally, I should be glad to know what others can tell about similar cases to the one here figured.

A RAT AS AN ENTOMOLOGIST.—On going to a street electric light on the evening of May 25th to collect insects, I was surprised to see a common rat busily engaged in the grass below catching and eating June Beetles (*Lachnosterna*).

J. FLETCHER.

BOTANY.

MEETINGS OF THE BOTANICAL BRANCH.

The sixth meeting was held at the residence of Mr. D. A. Campbell, on the evening of May 15th. He exhibited a large number of mounted specimens of plants with the object of illustrating how leaves seem to vary according to their environment. He held that where light is intercepted by water or by the crowding of plants, there is a tendency for leaves to subdivide. Prof. Macoun was inclined to hold that leaf-division indicated relationship rather than the effect of environment. In support of this, he mentioned the fact that the first leaves of the Horse Radish are much dissected, even in the driest soil. In the course of the discussion, this principle was enunciated : Generalize *from* not *to* facts.

As an aid to those who wish to become acquainted with the different species of violets, the information was given by Dr. Fletcher that at the Experimental Farm he had now growing all the recognized species of this locality, as well as some which had not been described. In addition, fine clumps could be seen of several other species from different parts of Canada and the United States. In all he had about 30 named species, many of these at the present time in full flower.

As far as known, all our wild plums are *Prunus nigra* and not *P. Americana* as was once supposed. The points of difference between the two species may be indicated in tabular form.

	Prunus nigra.	*Prunus Americana.*
1	Sepals serrate or serrulate.	Sepals entire.
2.	Petals white, becoming pink.	Petals white, not becoming pink.
3	Leaves crenulate-serrate.	Leaves sharply toothed.
4.	Fruit with no bloom.	Fruit with a white bloom.

Prof. Macoun mentioned that he had found the Shell-bark Hickory at Pointe du Chene, the locality recorded in the "Flora Ottawaensis" many years ago. Dr. Fletcher stated that it grew not only there but also in greater abundance at Casselman, Ont., 30 miles from Ottawa.

Dr. Fletcher, who had just returned from a trip to Hamilton, showed some remarkable sports of *Trillium grandiflorum* which,

in company with Mr. J. M. Dickson, he had collected in that district. The inner circle of the perianth was beautifully striped with green, and in some of the specimens almost as deeply green as was the outer circle. The foliage leaves were distinctly petioled, in some cases the stem being fully 3 inches in length. It was suggested that the variations might be due to some fungous disease. Dr. Fletcher mentioned several plants of which the whole habit changed when they were attacked by fungous diseases, for instance, some Euphorbias, Portulacca, Amarantus, Capsella, etc.; but did not think this sport was of the same nature. He had several plants of the Trilliums which had been under cultivation for 5 or 6 years, one of which had been figured in THE OTTAWA NATURALIST. The greening of the petals varied in extent year by year but had so far persisted, although showing a tendency to disappear. The lengthening of the petioles seemed to correspond to some extent with the amount of green on the perianth. This form occurs in several localities in western Ontario, but is abundant only in certain woods.

The remainder of the evening was spent in discussing the question: "What is Nature Study?" The general conclusion seemed to be about the same as that of C. B. Scott, who, in his "Nature Study and the Child," devotes an entire chapter in answer to the question. It is, he says, "*Nature, studied, in its relations, by the child, from the child's standpoint, by the teacher, with the children.*"

A. E. A.

VIOLA LANCEOLATA, L.

An interesting addition to the Ottawa flora has been reported by Miss Katherine Lee in the shape of the pretty little white-flowered Lance-leaved Violet (*V. lanceolata*), which was collected in flower May 25th by Miss Fanny Wright, close to the water on the sandy shore of the island in Fitzroy Harbour, Ont., near the Chats Falls on the Ottawa. This is the first time this plant has been found in the Ottawa district. It should be recorded on the floral distribution maps of the Ottawa district as in the Ontario Area West.

A FURTHER NOTE ON THE BLUE-TAILED LIZARD.

The interesting record, in the March number of THE NATURALIST, of the occurrence of the Blue-tailed Lizard, or Skink, at Stony Lake, reminded me that there were some other records of this little reptile's occurrence in Ontario.

For the seven or eight years from about 1885 to 1892, the Natural History Society of Toronto made an annual collection of reptiles to exhibit at the Toronto Fair, and on several occasions, during that time, we obtained Canadian specimens of the Blue-tail. They were usually rather difficult to feed and keep alive for any length of time ; but one adult, that I had, took flies and earthworms readily, and became tolerably tame. It buried itself for the winter under earth and leaves that were put into its case, and came out again all right in the spring.

I have inquired of Mr. Brodie, who was president of the Society, and of Mr. Hollingworth, who was secretary for a number of the years mentioned, if they remembered where our specimens came from. Mr. Brodie says that the species is found on the Georgian Bay, a little north-east of Midland, also along the north shore of Lake Erie from Long Point to Rondeau ; and Mr. Hollingworth remembers receiving one specimen from Muskoka.

It seems to be the only true lizard found in Ontario, and occurs, apparently, in a few isolated spots, though a careful search would, perhaps, reveal its presence in some other localities

J. B. WILLIAMS.

Toronto, May 5, 1903.

EXCURSION TO CALUMET, QUE.

Montreal Natural History Society.—The annual excursion of this thriving society is to be held on June 13th to Calumet. Our Club has been asked to join them The Council hopes that as many as possible of our members will avail themselves of this opportunity to meet our Montreal friends.

NATURE STUDY—No. II.

The Need of Nature Study.

By D. A. Campbell, B.A., Ottawa.

The infancy of every nation has been passed in open communion with nature, and has been developed under the expanding power of objective influences, the open landscapes, thetranquillity and solitude of forests, the massive grandeur and sublimity of mountains, the peace and beauty of valleys, the light-heartedness of laughing brooks, and the lofty and grave ministrations of sky and heavenly bodies.

The foundation of all education is a training of the senses, but in this artificial and introspective age we are losing sight of this objective influence of nature, ignoring the plan by which the human mind has been nourished and developed for untold generations.

Children in cities are being cut off more and more from the material most necessary for the free and healthful development of their powers. The mind is weaker, the intelligence is less active, when the child is in this way deprived of the food so necessary for mental growth. There is much more in those fresh air excursions sometimes provided for young people than a better atmosphere for a short time. The mind is being thronged at the same time with sensory stimuli, which cause brain function, and consequently mental power.

The best material for sensory training is that afforded by nature, and the time for it is especially the formative or growing period of the individual.

In our Public Schools no daily systematic training is given to the sensory side of the pupil's life. It may be claimed that some sensory training is given, recognition of words, places on maps, &c., but this, it must be admitted, is artificial and not natural material for the pupil to work upon. It lacks the multitudinous variety so apparent in Nature Study. There should be a portion of every school day set apart in our Public School course for a systematic training of the senses.

In the High Schools and Collegiates some provision is made for such work, but the time devoted to the subjects is limited, and

optional, whereas it should be compulsory for every pupil. The pupil at no stage of his school career should be left to chance for his sensory training, and this is especially true for those who live in cities. It is easy to persuade the pupil to do much for himself, to throw himself into contact with nature, to ramble through the woods, over hills, and along river banks, to leave the printed page and the burden of memory studies, and view the living face of nature in her wealth of objects, of phenomena and of landscape. The proper way to study nature is at first hand, and the proper way to train the senses is to use them on the abundance of material supplied by nature.

Besides the sensory training afforded by nature study there is a constant challenge given to the best powers of the mind, and there are supplied problems sufficiently difficult and abstruse to satisfy the most exacting.

It is a mistake to suppose that, for instance, the whole study of Botany is made up of technical terms and the collection of plants, giving them an unpronounceable name. Would Peter Bell, of whom Wordsworth tells us :

> " A primrose by the river's brim
> A yellow primrose was to him,
> And it was nothing more,"

be roused from his apathy, by the information that "the primrose is a dicotyledonous exogen, with a monopetalous corolla and a central placentation," and by the statements of many other facts in similar technical language? Would his indifference not rather be tenfold increased?

Although technical terms are as necessary in Botany as they are in any science or trade to the workers therein, yet botany must certainly not be looked upon as a "modernized repository of classical roots and derivations."

The real object of the study should not be lost sight of. A profitable study of Botany would lead one to investigate the structure of the plant, the infinite variety in leaf and flower, the intelligent and useful arrangement of the parts of the root, stem, leaf and flower, the assistance of a neighbor and the dependence of a flower upon the insect, its allurements such as nectar and pollen heralded by color and perfume for the purpose of attraction, the

debt of gratitude it owes its insect friend, its struggle to maintain itself and thereby its kind, the adaptability of its leaf to its probable share of sunshine and air, and the marvellous ingenuity in its method of dispersing its seed, its care and provision for its young, its habits as regards soil, moisture, light, climate, and time to bloom.

These are some of the questions which afford material for the use of the senses and for the exercise at the same time of the best powers of the mind, and promote as much mental development as those subjects which are now considered the most valuable in our programme of studies.

Let me illustrate by our common flower—the Dandelion, which, though trodden under foot daily, is teeming with interesting problems for the student.

While in its bloom, it lies low in the grass and is careful never to push its head above the average level of its garrison of grass. If the grass is long, however, its flower is raised up also. It would be interesting to know how it succeeds in accommodating itself so well to its surroundings. It is easier to see the advantage it is to the little flower, not to be so low down in the grass as to be completely smothered, nor so high above it as to be exposed to the whim of every passer by who, like Domsie, might cut off its head with his cane on some occasion when his joy overcame him. When its seeds are ripened, it pushes its head away above its surroundings and invites the violence which will disperse its seeds.

The Dandelion flower expands in sunlight; closes up in gloom. The advantage of such an arrangement must be manifest to all; but it requires the most careful study to ascertain the way in which it opens and closes apparently at will.

The attractive coloring must suggest some points of interest. Is the yellow color associated with a flower of a low or high organization? What scale of colors is adopted by nature in the decoration of her handiwork? A study of the flower will convince any one that color has an important relation to the plant. It is visited by insects and some observation will disclose the fact that color is for the express purpose of attracting insects.

The question suggests itself—What advantage comes to the flower in being visited by an insect? What compensation is made

to the insect for its valuable service to the flower? What happens to any particular flower which entertains no insect guest?

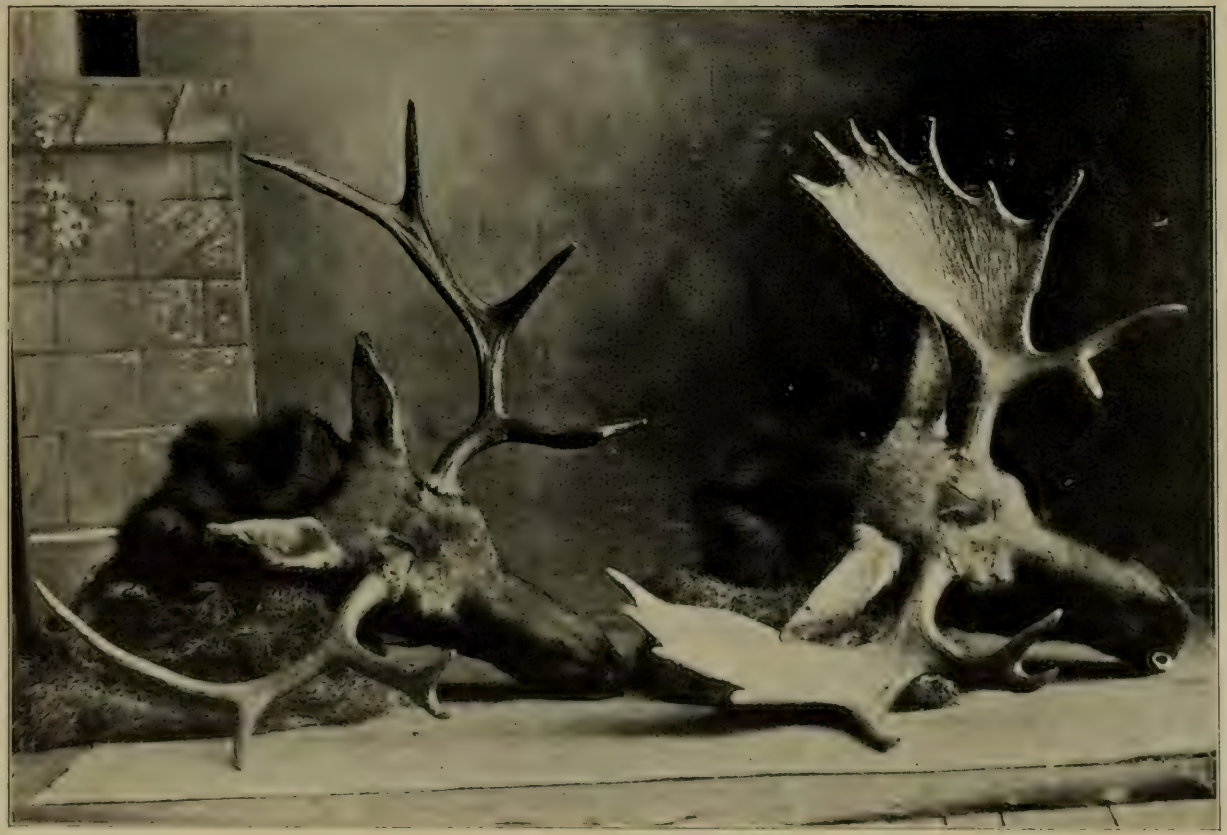
The dependence of flower upon insect and the co-relation of the individual and its environment will surely teach a lesson as applicable to human welfare as to vegetable.

This little plant has settled the question of aerial navigation for itself long before such questions agitated the Santos Dumonts of the modern world. Its tiny seed is fitted out with sails which bear it upon the winds of summer, upon a voyage of exploration and colonization. It settles down, making use of an anchor whose simplicity is only equalled by its adaptibility to its purpose.

The question of economy of material has likewise been carried to perfection, quite up to modern ideas upon the subject. It has been found that in ocean vessels carrying large masts, less iron may be used if the masts are hollow. Greater strength is given for the same amount of material. This common every-day flower long ago raised its head of florets upon a stem built upon the most recently improved pattern.

What place does the Dandelion occupy among flowering plants? A comparative study will show that its flower cluster is a highly organized one. It stands almost at the head of flower clusters and would seem to be one of Nature's latest productions. This may be learned by observation and comparison of flower clusters. The simplest clusters are such as those of the Pyrola and the Shepherd's-purse. In these the flowers have stalks all of nearly the same length, and the earliest flowers to bloom are the lowest. If these stalks were lengthened so as to bring all the flowers to the same level, we would have the flat-topped cluster, such as that of the Hawthorn. In such a cluster the earliest flowers to bloom are the outermost. If in such a cluster we were further to shorten the common stem upon which the individual flowers are arranged, broadening the top so as to make room for them, and, at the same time, if we were to eliminate the little stalks of each flower so as to have it rest immediately on the top of the broadened stem, we would have a cluster like that of the dandelion. This is the most perfect kind of cluster. Considering this, therefore, and remembering also the very great departure of each floret from the structure of such a simple flower as the Buttercup, for instance, we are compelled to believe that the Dandelion occupies, not the most exalted, perhaps, but a very high place in the commonwealth of flowers.

These are some of the problems which challenge the attention of the student. Here he finds abundance of material for sensory training, and at the same time is confronted by questions the solution of which will require his best thought and reflection.



Head of Moose with Elk Antlers, and another with normal Antlers.

THE OTTAWA NATURALIST.

VOL. XVII. OTTAWA, JULY, 1903. No. 4.

DESCRIPTION OF A SPECIES OF *CARDIOCERAS* FROM THE CROWS NEST COAL FIELDS.

By J. F. WHITEAVES.

The genus *Cardioceras* of Neumayr and Uhlig consists of a few species of Ammonites with compressed involute whorls, a crenulated keel, and acute radiating ribs,—that were formerly referred to the Amalthei of Von Buch, and that have hitherto been regarded as peculiar to the Callovien and Oxfordien subdivisions of the European Upper Jurassic. It was first described in the twenty-seventh volume of the "Palæontographica," published at Cassel in 1881.

In the second volume of the "Handbuch der Palæontologie" (1881-85), Zittel regards *Cardioceras* as closely related to the Liassic genus *Amaltheus*, but Hyatt, in his latest and much more recent classification of the Ammonites in Eastman's translation of Zittel's Text-book of Palæontology (1900), places these two genera in different families, and says that "the young are very distinct."

One of the commonest and best known species of *Cardioceras* is the fossil originally described by James Sowerby in 1813 (Mineral Conchology, vol. I.) as *Ammonites cordatus*, which is abundant in the Oxfordien of England, France, Switzerland, and Russia. Of this species there are several good specimens in the Museum of the Geological Survey, that were collected by the writer in 1859 or 1860, from the Oxford Clay and Coral Rag near Oxford, England.

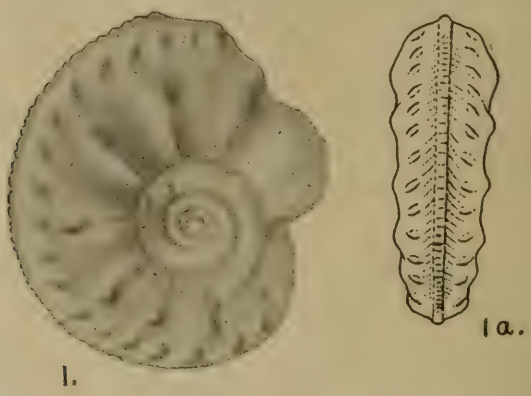
The genus has not previously been recognized in rocks of any age on the North American continent, but the *Ammonites cordi-*

formis of Meek and Hayden, from the Jurassic rocks of the Black Hills of Dakota, that was first described in 1858, is evidently a typical *Cardioceras*.

Three years ago, in June, 1900, Mr. James McEvoy who was then on the staff of the Geological Survey, discovered a small specimen of an Ammonite, that appears to be a true *Cardioceras*, from a coarse grit near the top of a ridge running N. 20° E. and situated two miles and a quarter N. 70° E. from Fernie, B.C., about 4,000 feet above the sea level. The specimen is only a natural hollow mould of the exterior of a shell that is imperfect at the aperture and about thirty-two millimetres, or an inch and a quarter, in its maximum diameter. But, this mould is so sharply defined that good white gutta percha impressions of it, or "squeezes" from it, show both the shape and surface markings of the whole of one side of the fossil and of part of the other, remarkably well.

These impressions indicate the immature stage of a species of *Cardioceras* that seems to be very closely related to the European *C. cordatum*, but that may be provisionally named and described as follows.

CARDIOCERAS CANADENSE, nom. prov.



Cardioceras Canadense.

Fig. 1. Side view of a gutta percha impression from the natural mould collected by Mr. McEvoy.

Fig. 1*a*. Peripheral view of the same, slightly restored on one side.

Fig. 1 slightly enlarged, Fig. 1 *a* of the natural size.

Shell, at least in its immature stage, compressed, shallowly and rather widely umbilicated, with a small and minutely crenulated keel. Whorls about five, increasing rather rapidly in size and rather strongly embracing, about one-half of the sides of the inner ones being covered by the overlap of those that succeed them. Umbilicus occupying about one-third of the entire diameter, on each side, though its margin is rounded and very indistinctly defined ; peripheral carina neither very prominent nor distinctly compressed.

Surface of each side of the outer volution marked with a few comparatively large and distant but narrow and acute primary radiating ribs, that commence at the suture and terminate about half way across, in a small pointed tubercle. Of these ribs there are about ten in the specimen figured. Besides them there are rather more than twice as many small short secondary ribs, that are little more than narrow, transversely elongated, compressed and acute tubercles, on the outer half of each side. The primary ribs almost bifurcate from a median tubercle, and seem to occasionally alternate with an intercalated secondary rib, but the secondary ribs are not quite continuous with any of the primaries. Between the secondary ribs, also, and parallel to them, there are a few fine radiating raised lines.

Sutural line unknown, as are also the exact shape and sculpture of the adult, and the contour of the outer lip.

Judging by Meek and Hayden's figures, specimens of *C. cordiforme* of about the same size as the fossil collected by Mr. McEvoy, have much smaller and more numerous radiating ribs, that are devoid of tubercles.

The discovery of a species of *Cardioceras* in the Crows Nest Coal fields is of considerable interest, as tending to show that the grits in which it was found are probably of Jurassic age. Associated with *Cardioceras* in these grits, there are fragments of guards of a rather slender belemnite.

Ottawa, June 6, 1903.

NESTING OF SOME CANADIAN WARBLERS.

THIRD PAPER.

By WM. L. KELLS, Listowel, Ont.

BLACK-THROATED GREEN WARBLER (*Dendroica virens*).

This species is more often observed in the periods of the spring and fall migrations than during the intervening season, except in certain favorite localities. The majority of these migrants that pass through south-central Ontario in the spring season, appear to go further north for the nesting season; though it may be that many more pairs remain and nest in the swamp woodlands of south Ontario than the few who in this country have yet made the life-history of our minor woodland birds a subject of special study are aware of. Occasionally, specimens of this species are noted in certain lowland woods in the vicinity of Listowel, in the breeding season; and every year—in early summer—I note the song of the male bird at a period when the female is doubtless incubating. I feel certain that some of the species nested on *Wildwood* in past years, for on one occasion I examined a specimen of this species in its nesting plumage, that was shot in the back wood on the premises, in the month of August; and, earlier the same season, a pair had been noted frequenting a clump of conifers in the vicinity; but the clearing up of the original forest and the draining of the low grounds have, with the improvement of the country, effected many changes in the summer haunts and nesting homes of various species of our woodland birds,—among others, in the more original habits of the beautiful and ever interesting Black-throated Green Warbler.

In the middle of June of last season (1902), I was agreeably surprised to discover a pair of these wildwood rangers in full song, and actively gleaning their insect prey, in a large, deep-shaded orchard, five miles west of this town. For some time my companion and I watched the movements of both sexes among the foliage, and listened to the song of the male with deep interest. This performance was effected in a very animating manner, but in a rather doleful tone, and much resembled the song of the White-crowned Sparrow, but was more subdued. This was the nesting time of the species; I was, therefore, in hopes of finding their

nest, and for a time my hope of collecting the eggs seemed about to be realized, as I saw the female fly to the top of a tall apple tree and alight beside a newly-formed nest. On examination I found the nest completed, but it contained no eggs ; it was composed of materials much similar to that of a Chipping Sparrow, but not nearly so bulky as the nests of this species usually are. However, neither time nor circumstances permitted me again to revisit the site till the nesting season was over ; but I feel certain that the bird nested in that orchard the past season.

On the 11th of May past, I noted this species, the first time for the season of 1902, in a lowland wood north-west of this town. It was then in its beautiful spring plumage and mingling its song notes with those of a number of other Warblers—also new to the season—and all were actively searching for their insect food among the budding branches of the forest trees. Here, I have no doubt, some pairs of them remain through the season, and nest, as I think, also in another tract of woods to the south of the town, where every June I hear the song of the male of this species.

The Black-throated Green Warbler is a lively, active species ever on the move during daylight hours, and from the time of its spring advent till the nesting period is over, a constant and not unpleasing songster. This period extends from the second week of May to the first week of July, after which it is heard no more for the year, though it is probable that it remains in the vicinity of its summer home till the advent of September, when, with other species of its family, and the other woodland birds, it leaves this country and begins its aerial voyage towards its southern home, which appears to be the shores and islands of the Gulf of Mexico. In February the species begin their northward return journey ; but it is the early days of June before the more adventurous reach the northern limits of their wanderings. Thus, year after year, such repetitions of movements constitute the principal features of the life history of the species, but it cannot with certainty be told what term of years constitutes the "old age" of a warbler : probably ten to fifteen years is with them the allotted span of existence.

The Hon. G. W. Allen, of Toronto, one of the pioneer ornithologists of Ontario, writing to "The Ontario Farmer," says

regarding this species: "The Black-throated Green Wood-Warbler is occasionally seen through the summer in this part of Canada; but I have never met with the nest of this bird, and am inclined to believe that the majority of them breed farther north. They appear here in little parties of twos and threes on their southward journey in September, and are said to spend the winter in the tropics. Their plumage is very beautiful. The male has the upper parts a very light yellowish green; the front of the head, a band over the eye, the cheeks and the sides of the neck and the upper parts of the sides of the body, are deep black; the rest of the lower parts are white, tinged with yellowish; the quills and tail feathers are brownish-black, the secondary coverts largely tipped with white, as are the tail feathers, of which the greater part of the outer three, and a patch on the inner web of the fourth, are white. . . . Those who have seen the nest of this species describe it as being placed among the thick branches of an evergreen tree, from 20 to 50 feet off the ground, and being composed of small twigs, strips of pine bark, fibres of wood, and horse-hair; and the set of eggs to be four in number, of a whitish hue, spotted with reddish-brown."

Mr. Vennor, in his Notes on the Wood-Warblers of Montreal, 1861, does not mention this species; but Mr. D. Wintle, in his "Birds of Montreal," 1896, records it as a "common spring migrant," but a scarce summer resident. "I saw one on June 18, 1887, in Mount Royal Park, and shot a male and a female specimen on July 1st, 1885, at Calumet; also observed two or three young of this species on August 27, 1892, in Mount Royal Park. Observed here in spring, in May, and in autumn, from October 4th to 10th."

Mr. McIlwraith, in his "Birds of Ontario," says: "The Black-throated Green Warbler is a regular visitor in spring and fall. It appears earlier in spring than some others of its class, and soon announces its arrival by frequent utterances of its characteristic notes, which are readily recognized when heard in the woods."

Mr. M. Chamberlain, of St. John, N.B., wrote regarding this species: "It occurs from the Atlantic border to Lake Huron, and

north to Point-des-Monts. It is said to range to the Great Plains, but has not been observed in Manitoba."

In Cook's "Birds of Michigan," this species is recorded as a common spring and autumn migrant, yet as nesting in various parts of that State.

Mr. C. W. Nash, in his "Birds of the Garden," has written regarding this species: "With the Black-throated Green Warbler we have more concern (than with the Black-throated Blue Warbler); it is quite common and regularly breeds throughout its range in the province (of Ontario); though, unless there are a good many green trees about, it is not likely to stay in the garden to nest, its preference seemingly being for rather open places, where cedars and hemlocks are dotted about. In some large gardens I know, I find it settled every summer. It has a rather peculiar sort of song, which it keeps up all through the season, even in the hottest weather, when nearly all birds are silent. It leaves us early in October, and goes south to Central America."

REPORT OF BOTANICAL SECTION, 1902.

During the spring and summer of 1902 there was a revival of interest among the botanical members of the Club, and more work was done than has been accomplished in any season for some years. Foremost among those who were at work were Dr. Fletcher and Professor Macoun, who studied special genera and re-visited many of the localities at which the rarer species growing in this vicinity are to be found. Many new stations of little known species were discovered and several new species were added to the local flora.

Dr. Sinclair and many of the Normal School students were at work both in the spring and in the autumn, and a greatly increased interest in botany was noticeable among the students.

Though comparatively few of those attending the Ottawa University are members of our Club, we are pleased to record here that many pupils, with their instructors, made frequent excursions into the fields and woods of the vicinity. These have

resulted in not a little new information concerning the distribution of our local plants.

Dr. Cephas Guillet continued his field instruction to the boys attending his school. Over 500 species were noted in flower.

In addition to the general work recorded above, many individual members of the Club were active in field research.

One of the results of this renewed activity in botanical study has been the inauguration of bi-monthly meetings of the botanical section. Two meetings have been held this year, the first at the house of Dr. Fletcher, the second at Prof. Macoun s. The principal object of these meetings is to enable working botanists to keep in touch with one another and so make it possible for them to work with greater advantage to themselves and one another.

Dr. Fletcher is growing all the species of Canadian violets obtainable, and he now has all of the Ottawa species, most of which are thriving under cultivation. Plants of nearly all have been grown from seed.

April 19. A sub-excursion of 150 to Aylmer. *Epigæa repens* was collected in perfection of bloom. *Acer rubrum* was also in full flower and exceptionally bright in colour this year.

April 26 was too wet for a sub-excursion.

May 3. Sub-excursion to Beaver Meadow, Hull, which about 60 attended.

May 10. Sub-excursion to Rideau Park ; 40 turned out. A severe frost the previous night (13 degrees) had spoiled nearly all flowers open at the time.

May 17. First excursion ; 300 attended. A large botanical class of Normal School students.

May 26. Sub-excursion to Rockliffe. Violets in bloom ; but, as a class, these plants were much injured this year by the frost of May 9-10.

May 31. There was a small sub-excursion to Dow's swamp.

The long autumn of 1902 with good collecting weather enabled the botanists to do a great deal of active field work ; sub-excursions were held during September to Rockliffe, Aylmer, Chelsea and Hull.

The first severe frost was not till October 4. On September

6 a large botanical excursion was held to Gilmour's Grove, Chelsea ; 150, including many of the Normal School students, attended. Violets in fine fruit were collected, and the differences between the species represented were explained by Dr. Fletcher.

J. M. MACOUN.
CEPHAS GUILLET.
D. A. CAMPBELL.
A. E. ATTWOOD.
S. B. SINCLAIR.

ANOTHER INSECT COLLECTOR.—Dr. Fletcher's note in the last number of THE NATURALIST calls to mind a similar interesting incident noted on the 8th June. In this case, however, it was a young Red Squirrel, which was busily engaged eating a June Beetle (*Lachnosterna*). These beetles, especially when they are as abundant as during the present year, doubtless furnish food for many of our small native mammals.

ARTHUR GIBSON.

SUB-EXCURSIONS.

The fourth weekly outing of the Club was the second visit to a part of that division of the Ottawa district henceforth to be known as Quebec West. On the afternoon of Saturday, May 2nd, at least 120 members and friends rambled about the Beaver Meadow, collecting specimens in various branches of natural history.

The most striking characteristic of the amateur botanist of this season is a desire to acquire at least a nodding acquaintance with our native trees. So closely were the leaders pressed in the work of identifying twigs and sprigs that they fervently wished that either night or a professional botanist might come.

At 4.30 about one hundred persons assembled to hear the speakers. Dr. Sinclair presided. Mr. J. C. Spence gave the names of all the plants in flower that were submitted. Mr. A. E. Attwood said a few words on the principles observed in naming plants. Mr. S. E. O'Brien showed a fine specimen of the Walk-

ing Fern (*Camptosorus rhizophyllus*) which he had found among the rocks to the west of the Beaver Meadow. This fern is rare but is also found in several other places near Ottawa.

Mr. W. J. Wilson informed the audience that the best example in this region of a moraine was to be found directly north of the Chaudiere bridge. The mass of débris is pierced by the railway that crosses the Royal Alexandra bridge. In the course of his remarks he said that, while a mineralogical specimen should always have a fresh surface, a rock that has been long exposed is often more serviceable for palæontological purposes, as the fossils are then weathered into prominence.

Mr. Andrew Halkett exhibited a classified collection of small animals captured during the afternoon. After speaking at some length on the various representatives of the different orders of Invertebrata, he showed two species of snakes—the Garter Snake (*Eutainia sirtalis*) and the Grass Snake (*Leiopeltis vernalis*). There was a mild protest offered when he asserted that the snakes and the members of the audience belonged to the same class—Vertebrata.

A party of entomologists and botanists accompanied by Dr. Fletcher and Mr. Gibson went as far as Fairy Lake and made very interesting collections. Unfortunately, this party got back to the rendezvous too late to take part in the addresses.

A. E. A.

On the 9th May about 200 members and friends of the Club met at the southern end of Preston street to enjoy the fifth sub-excursion of the season to the Central Experimental Farm. Here they were met by Dr. Saunders and the officers of the Farm. As an unusually large number of leaders in all branches of the Club's work were present, their presence added much to the value and success of the outing. After a short stop in the woods bordering St. Louis dam, where the spring flowers of *Viola Dicksonii*, *V. pubescens* and *V. canina*, var. *sylvestris*, were in excellent condition, a start was made for the Arboretum and Botanic Garden of the Experimental Farm. Here a considerable time was spent in examining the large collection of shrubs and trees. Those which were most admired, were the pines, larches

and spruces. The different species of ash also attracted attention. Some of the early butterflies were noticed, but none of them were numerous. The early white *Pieris oleracea-hiemalis* was the most abundant, and some nice specimens were secured. A single example of the small Fritillary (*Argynnis bellona*) was seen flying ; the 9th May is an early date for the species.

Shortly after 5 o'clock the company gathered near the Director's house, where Mrs. Saunders had kindly prepared most welcome refreshments. At the request of the President, Dr. Saunders gave an interesting talk relating to some of the work carried on by the Dominion Experimental Farms. Special mention was made of the value of the experiments in the hybridizing of fruits for the North-west, which gave every promise of great success. On invitation from the President, several questions were asked by some of those present, on natural history and farm work. Short addresses were also delivered, appreciative of the good work being done by the Club, by Mr. White, the Principal of the Normal School, and by Father Lajeunesse, of the Ottawa University. Before the members dispersed, the President drew their attention to the presence, in a near-by tree, of the Purple Finch and the Brown Thrasher. These charming birds were singing merrily, each vieing with the other to enchant the visitors with the sweetness of their notes.

A. G.

The excursion of May 30th to Queen's Park, Aylmer, was attended by some twenty members of the Club—mainly from the botanical section. The burnt grass and the scarcity of many of the flowering plants told of the unusual spring drought but emphasized the beauty of the trees and shrubs. Especially worthy of note was the tall, graceful Sweet Viburnum (*V. lentago*), very prominent near the Chute.

During the afternoon Prof. Macoun found *Salix longifolia* and *Salix amygdaloides*, and Mr. O'Brien discovered both species of Hepatica. *Ranunculus septentrionalis* was found along the line of the railway, and a fine patch of the large yellow Water-Crowfoot (*Ranunculus multifidus*) in the swamp. Prof. Macoun and Mr. Clarke came upon a nesting whip-poor-will in a shady, retired spot. The bird floated from the nest in its moth-like

manner, and disclosed the full set of two eggs in a mere depression of dead leaves. It alighted near at hand and remained motionless, thus permitting a sufficient description.

The excursionists assembled to listen to short addresses from the leaders. The president, in answer to a request, made a promise of a field guide to the trees of the district. Mr. Attwood explained his system of recording field notes, and Prof. Macoun emphasized the necessity of written observations.

T. E. C.

BOTANY.

MACRAE'S CORAL-ROOT (*Corallorhiza striata*, Lindl.).

A beautiful specimen of this widely distributed, but always rare orchid, was found at Renfrew, Ontario, in full flower, on 23rd May last, by Master John Forgie, who has kindly presented it through Mr. W. A. Stickle, the Principal of the Renfrew Model School, to the herbarium of the Central Experimental Farm. It is a very acceptable addition to the collection. This species, though very local and very rare, is widely distributed. I have received specimens from Masset, Q. C. I. (Rev. J. H. Keen); Victoria, B.C. (J. R. Anderson); Aweme, Man. (Norman Criddle); and Ottawa.

J. FLETCHER.

A DOUBLE TRILLIUM GRANDIFLORUM.

On the 21st of May last, Miss Edith Courtney showed me a very handsome large double trillium that her father had found at Chelsea. Instead of three white petals, it had some twenty-four, arranged, though without perfect regularity, in six groups of four each, the six outer petals being the largest, the others getting smaller towards the centre. It presented the appearance of a beautiful white rose. Unfortunately, the root was not obtained; otherwise, the attempt might have been made to preserve so lovely a variation by cultivation. Is it not possible, however, that such a variety might be produced by cultivation?

CEPHAS GUILLET.

ERRATUM.—In the June number of THE NATURALIST, on page 55, line 3, instead of "hissing sound," read "kissing sound."

HUNTING FOR CATERPILLARS.

By ARTHUR GIBSON,

The study of insect life is so intensely interesting that it is difficult to say which branch of entomology is the most fascinating; each has its own devotees. One branch of the subject which certainly is exceptionally useful and fascinating, is the collection and study of our native caterpillars. Of late years much has been done in working out the life-histories of American insects, but there is still a vast field in which to make research. The life-histories of our butterflies are fairly well known, but only a very small percentage of the larvæ of even our common moths have been studied. Lepidopterous larvæ can be collected at any time of the year, but the best opportunities are to be found during the summer for acquiring a knowledge of these interesting creatures.

It is strange that most people seem to regard caterpillars as repulsive, horrid things; but this, of course, can only be accounted for by the fact that they have never really taken the trouble to look at one. None of Nature's children are horrid. It is only our unfortunate uninterestedness that is accountable for such inaccurate views. There is really nothing in nature which is not beautiful, if carefully examined and properly understood, and, even those caterpillars which are thought by many to be most repulsive, are of themselves not at all responsible for feelings akin to disgust or horror. When exhibiting a case of butterflies or moths, it is quite usual for the onlooker to make some remark regarding the beauty of the specimens; but, when shown the caterpillars of these same species, our visitor, as a rule, shrinks back, and a remark not at all corresponding with the first exclamation is heard. Although presenting sometimes a rather formidable appearance, with the exception of a very few kinds, which are provided with irritating hairs, caterpillars are quite harmless. Some of the Sphingidæ will jerk their heads from side to side and even snap their mandibles, but they are unable to bite anything

thicker than the edge of a leaf, as a very slight examination will show.

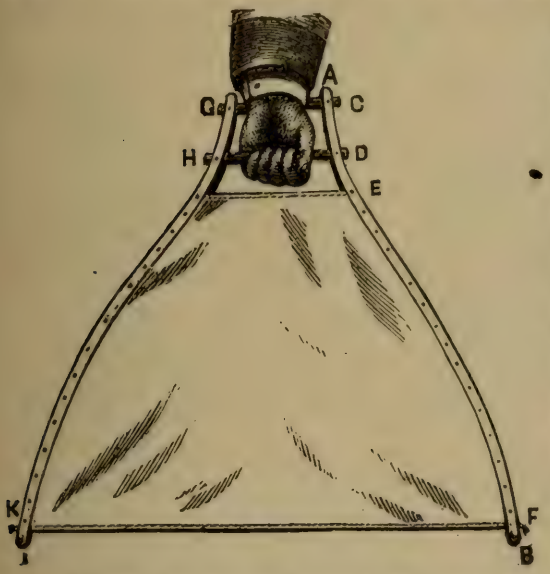
Insects are so abundant that they can be found at any time, and almost in any place. Their presence everywhere offers a ready means for learning something of the ways and habits of the creatures which constitute so large a portion of the animal kingdom. Even a cursory study of any of our caterpillars will soon convince one that there is much of interest as regards the habits of even the commonest species, many of which show remarkable traits.

During the first warm days of spring, even before the snow has entirely disappeared, reddish or mouse-coloured hairy larvæ, about an inch in length, are often seen walking across the sidewalks of outlying streets, or especially along the railroad tracks. These are the caterpillars of *Phragmatobia rubricosa*, Harr., and are chiefly interesting to local collectors in view of the fact that two distinct forms of the moths have been met with at Ottawa, and it is not at all improbable that we may have here two good species instead of one, as now recognized by standard lists.

The spring time is also opportune for the collection of arctiid and noctuid larvæ, under stones, etc., particularly in open places. Along the grassy sides of railroad tracks there are usually numbers of strips of bark, broken pieces of plank, etc.; and, underneath the same, many of these larvæ, which pass the winter about half, or nearly full grown, can be found hiding at that time of the year. The old leaves of mullein plants also harbour various kinds of caterpillars.

After the May and June, by which time many caterpillars will have hatched from eggs laid during those months, doubtless the most prolific way of collecting larvæ is by beating them off the plant they are feeding upon, into a beating net. Dealers in entomological supplies have for sale nets made specially for the purpose; but the accompanying figure shows a good pattern for an easily made net, which can be held beneath the plants with one hand, while the larvæ are beaten down on to it with a light rod held in the other hand. This beating net consists of a stick on each side and a flat sheet of cotton between, three feet wide at the top and one foot at the bottom. Two cross bars close together

at the base allow of this net being easily held by taking the upper bar in the left hand, so that the lower bar rests against the back of the wrist. We have used these nets in connection with our official field work and have found them very serviceable. Dr. Fletcher has recommended them in his departmental reports as of much value in collecting various insects which are troublesome to the market gardener, etc., so that they can be afterwards destroyed.



There are many kinds of caterpillars, however, which cannot be collected by beating, or gathered from beneath stones, bark, etc., on the ground. Some of these are borers, which pass the whole of their larval existence feeding inside the stems and roots of various plants. The caterpillars of the genus *Papaipema* (*Hydræcia*) have, within the last few years, been given special attention by some students. These larvæ are true borers and work within the stems of burdock, goldenrod, etc. *Papaipema cataphracta*, which bores in burdock, is a common species at Ottawa wherever the plants are numerous, and the presence of the caterpillar can usually be detected by the withering and discolouring of the tips. The caterpillars of *P. appassionata*, which have only recently been discovered, were found, by Mr. Henry Bird, of Rye, N.Y., feeding in the roots of the Pitcher-plant (*Sarracenia*). Last season, when at the Mer Bleue, the writer examined many pitcher-plants, but could not find any larvæ, although in the root of one plant the work of a noctuid caterpillar was detected, as well as some frass, but of course we do not know that it was of this species.

Other larvæ of smaller species of moths form various [illegible] of cases, inside of which they live and change to the pupal

and some kinds even produce galls, or more or less decided enlargements of the stems of their food plant. These of course can only be collected by hunting for them at the proper time. A large number of still smaller caterpillars are leaf miners feeding on the soft cellular tissues under the epidermis. The moths of these leaf miners are very beautiful, but delicate little creatures.

The tips of plants may often be seen drawn together by threads of fine silk, and, if the leaves are separated, the caterpillar which caused this tying can be collected. A species of economic importance, because it does considerable damage at times, has been called the Greenhouse Leaf-tyer, from the habit it has of drawing the leaves of the plants together, and fastening them with silk.

The pleasure derived from collecting caterpillars and watching their varied habits, will be found very helpful and fascinating. There are many lessons which they teach us, from which we could derive untold benefit. Every species is worthy of study, and, as there is so much yet to be done in working out the life-histories of our butterflies and moths, particularly of the latter, there is in this branch of study alone a vast field for much original investigation. The value of such work cannot be overestimated. From an economic standpoint, it is only when a complete knowledge of all stages is known that we can hope for the best results in combating the ravages of many injurious species. I feel sure that anyone who devotes any time to the rearing of larvæ, will not regret the hours spent in collecting and watching their specimens. On the contrary, however, they will be surprised at the interest they find themselves taking in the development of their captures, and even if they should not be successful in bringing the specimens to maturity, they will not, I venture to say, allow this disappointment to lesson the interest aroused in these creatures.

NATURE STUDY—No. III.

(The following is the concluding summary of Dr. S. B. Sinclair's lecture on "Nature Study in American Universities," delivered to the Club on February 10th. A *full* report is given in the May and June numbers of the Educational Monthly of Toronto.)

It may be said that experimentation and investigation have established the following general principles regarding Nature Study.

1. Nature Study should not be considered the be all and end all of education. The humanities and mathematics must always be prominent subjects in a rationally constructed school curriculum. It is probable, however, that with wiser selection of subject matter and method in every department, better results will be secured with less expenditure of time and energy than formerly, and that the introduction of Nature Study will not prove an additional burden to the student.

2. Nature Study should have a place in the curriculum of every grade in every elementary school. The work in early years should consist of that comparatively spontaneous, non-technical and undifferentiated study of surroundings which develops in later life into a scientific study of Nature with a definite problem and by careful and accurate laboratory methods.

3. The aim of such study in the elementary school is not so much information as character. The purpose is not at the beginning to furnish a scientific laboratory training or to fill the mind with scientific facts, but to develope an attitude—a power of interpretation and appreciation of Nature and also a power of self-expression, which will enable the child to gain better control of himself and of his surroundings, to live a fuller life and to be of greater service in society than he otherwise would be.

4. In the selection of materials and methods, this aim should be kept in view. For example, the study of the various processes by which the wool of the sheep is worked up into cloth, is usually of greater value educationally to the city child than to the country child, who may already be fairly familiar with the facts. Thus, it is impossible to lay down a definite course of study which will be adapted to different school conditions. The material studied should be closely related to the problems of child life experience

and should be adapted to the hunger and needs of the child. During the symbolic or play period of later infancy, and during the keenly observant but still comparatively unreflective period of early childhood, emphasis should be cast upon the sensory-motor, the historic, the individual, the social, rather than upon the abstract, the technical, the scientific.

In the primary grades of the school, therefore, the greatest stress should be placed upon activities connected with the child's immediate experience, involving a study of his surroundings—geography and history.

While the work should be purposive, it should not to any great extent appeal to the *commercial* instinct. The child is usually specially interested in certain living forms of plants and animals ; but he is not interested in *all* such forms, nor are inanimate objects devoid of interest to him. The construction of a thermometer or a study of various forms of water may lie closer to the child's life interest than an investigation of certain animal forms.

The material should not be selected on the basis of trivial superficial interest, but should be of such a nature that when the child realizes what is there and what it means to him, it will become interesting. The despised and persecuted common toad, usually looked upon as an ugly venomous and loathsome beast, becomes an object of genuine interest when the child learns that the toad is entirely harmless, that it is one of the most humane and valuable fly traps yet discovered, that it destroys large numbers of injurious insects, that its life cycle extends over thirty years, that it is easily tamed and that it is destined to become a valuable and highly appreciated domestic pet.

5. The study in the initial stages should not consist of set formal lessons. For example, the metamorphoses of an insect or the development of a plant from seed to fruit may be observed for months, with an occasional brief conversation to organize the facts learned up to the present, and to direct observation for the future. By spending an hour a week, in brief or extended discussion (as the conditions of the case require), much valuable work can be done in every grade. The school garden, and the field excursion, when properly conducted, afford the ideal conditions for elementary Nature Study.

6. While supplementary readers, pictures, lantern illustrations and prepared specimens are of great service when properly used, their advantages can easily be over-estimated. Nothing can take the place of living interest and actual contact. The pet squirrel that the child knows as a companion and cares for day by day, the flower which he has planted and watered and provided with proper light, heat and moisture conditions, is a thousand times better than any dead specimen.

7. Technical terms and static classification should not to any great extent enter into the initial work. In this connection, Burrough's criticism is well taken when he says: "The clerk of the woods is so intent upon the *bare fact* that he does not see the spirit or the meaning of the whole. He does not see the bird; he sees an ornithological specimen. He does not see the wild flower; he sees a new acquisition to his herbarium. In the birds nests he sees only another prize for his collection. Of that sympathetic and emotional intercourse with nature which soothes and enriches the soul, he experiences little or none."

8. The best results will never be obtained until Public School classes are reduced to a sufficiently small number (say a maximum of forty) to admit of individual supervision, and until teachers know enough of natural science to make them enthusiastic and wise leaders. Under present conditions in graded schools, the latter difficulty may in a measure be overcome by an interchange of teachers of different classes, which will make it possible for the specialist in science to teach in different grades. A primary class in a well organized school does not suffer by a change of teachers several times during the day.

9. Nature Study should be correlated with other cognate studies, especially with form study, drawing, and colour work. The representations should be mainly from life and imagination and not from copies. Modelling should form an important feature.

The subjects studied in Nature lessons may be made the basis for drawing lessons. The study and representation of abstract conventional type forms should not precede the investigation and expression of the forms of the individual objects met with in the child's experience. It is not surprising that the schools do not develop more and better artists, when we consider the character of

the work done. With but few exceptions colour is never referred to, and much of the drawing work is conventional and lifeless.

All who have observed the results of a sequential course in the study of life forms accompanied by expression in model and colour work from the kindergarten through the entire school course, must be convinced of the great value of such training. So long as the public are content with the notion that the acme of school art is achieved when pupils can draw straight lines to vanishing points, little will be accomplished.

Such a reform would necessitate the securing of teachers of drawing who are themselves artists and who possess sufficient knowledge and love for Nature to enable them to guide their pupils to artistic expression. This would involve an additional expenditure for teacher's salaries ; but, even from the commercial standpoint, the extra amount would be a good investment.

WHAT IS NATURE-STUDY?

Nature-study from the public school teacher's point of view is the maintaining in educative directions of the child's natural interest in its environment. For such work the knowledge of paramount importance to the teacher is the knowledge of child-nature ; the knowledge of plants, animals, earth and sky, though necessary, is secondary. Learning to train the child how to use the materials of knowledge, obtained at first-hand through sense-activity, in the proper development of the intellectual, emotional and volitional phases of its being, is the indispensable preparation of the successful teacher of nature-study. The name is unfortunate because it is so liable to be regarded as the equivalent of acquiring knowledge of nature. Even some who are writing books and giving lectures to teachers on nature-study (*sic*) are substituting information for education. Educationally, the study of nature may be different from nature-study and as inferior to it as a horse-chestnut is different from and inferior to a chestnut-horse.

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THE OTTAWA NATURALIST.

VOL. XVII. OTTAWA, AUGUST, 1903. No. 5.

PETROGRAPHY OF SOME IGNEOUS ROCKS OF THE KETTLE RIVER MINING DIVISION, B.C.

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The district from which the following specimens were collected is a comparatively new mining locality, situated between lat. 49° and 50° and long. 118° and 119°.

The specimens were collected by Mr. W. F. Robertson, Provincial Mineralogist of British Columbia, and sent to Dr. Frank D. Adams, Professor of Geology at McGill University, who intended to make a microscopical examination of them. As, however, the writer was working in the Petrographical Laboratory of McGill University at the time, Dr. Adams kindly consented to hand them over to him, and the following descriptions have been written with Dr. Adams's help and under his supervision.

As no petrographical work has hitherto been done in connection with this district, the writer decided to publish his observations, hoping they may be of interest as descriptions of rocks immediately connected with ore deposits of what may prove to be an important mining region.

The sentences between inverted commas are quotations from Mr. Robertson's notes on the respective occurrences. These, together with the descriptions of localities, are taken from his report on the district, which appeared in the Annual Report of the Bureau of Mines of British Columbia for the year 1901. The numbers are taken from Mr. Robertson's specimens.

Numbers 117, 120, 138, 125 were all collected from Aspen Grove.

No. 117.—Taken from Big Watchman Mine.

"..... A rock which has the appearance of being a volcanic agglomerate or breccia containing considerable lime."

Hand specimen is a fine-grained greyish rock, showing a few stains of green carbonate of copper on the joint planes.

Under the microscope, the rock is seen to be composed of a fine-grained groundmass of plagioclase felspar, in which are imbedded large porphyritic crystals of felspar twinned according to Albite and Carlsbad laws, some untwinned individuals and some microperthitic intergrowths of albite and orthoclase. There are also some forms which are now entirely filled with magnetite and chlorite, but which, from the shape, once belonged to some ferro-magnesian constituent, in all probability hornblende. There are areas in the section which consist of angular and subangular fragments, giving to it a brecciated appearance and which once evidently belonged to some closely related volcanic rock caught up by this one while it was in a molten condition.

The rock is an altered andesite, which in some parts of the mass probably passes into an andesitic tuff or breccia.

No. 120.—From Big Sioux Mine, Aspen Grove.

"The country rock appears to have been of igneous origin and is somewhat similar to that of the rest of the camp; but at this point it has been considerably altered and now approaches serpentine."

The hand specimen shows a massive fine-grained greenish-coloured rock, having green carbonate of copper stains in the cracks and on the weathered surfaces.

Under the microscope, the rock is seen to be very much altered and to consist of a groundmass and phenocrysts. The former makes up a very small proportion of the rock and consists of small plagioclase crystals. The phenocrysts consist of felspar, in large laths, showing twinning according to both the Albite and Carlsbad laws, some individuals having these two combined, thus allowing of the determination of their composition by Michel Lévy's admirable method.* By this it was found such individuals

* See Becker, G. F., on the Determination of Plagioclase Felspars in Rock Sections. Amer. Jour. of Sc., May, 1898.

consisted of an oligoclase with the composition $Ab_3 An_1$. There are also aggregates of epidote and chlorite, frequently having definite outlines, which give them the appearance of being secondary after augite. Calcite is also present as a secondary mineral ; and, as accessory constituents, ilmenite, leucoxene and sphene are found in considerable quantities.

On account of the very considerable quantity of augite which was present in the original rock, as well as on account of the large proportion of iron ore present, the rock possesses a distinctly basic character, and consequently is better classed as a basalt than as an augite andesite.

No. 125.—From the Medal Mineral Claim, Aspen Grove.

"It is an extension of a dyke of from 10 ft. to 12 ft. wide, of lighter colour than the general rock, inclined to be porphyritic in structure and containing much lime ; there is an impregnation of copper sulphide, but not of important quantity."

The hand specimen shows fine-grained reddish-looking rock containing greenish chlorite aggregates and a little chalcopyrite.

Under the microscope, it is seen to be of volcanic origin, being composed of idiomorphic plagioclase containing zonally arranged alteration products and some individuals of pale green augite. The rock in some places shows a brecciated structure, the phenocrysts having broken outlines, while elsewhere may be seen aggregates of epidote individuals, apparently representing inclusions of some highly altered foreign rock. There are also certain forms now outlined in hydrated oxide of iron and filled with decomposition products, highly suggestive of the former presence of olivine. Biotite is noticeable, but is in nearly all cases wholly or partially altered to chlorite.

Native copper is present in the slides and, from its appearance, seems to be of secondary origin. It borders the plagioclase crystals in narrow strings and also occurs in bunches, running off in little strings which pass through the cracks. It sometimes occurs filling spaces which were once occupied by olivine.

The rock was probably a basalt.

No. 138.—From the Magpie Mineral Claim, lying to the west of the Big Sioux.

Hand specimen is a fine-grained greenish rock, impregnated with pyrite and chalcopyrite.

Under the microscope, the rock is seen to be much altered and to present a distinct porphyritic character, the phenocrysts being relatively more abundant than the groundmass, which is composed mainly of felspar laths Of the phenocrysts, the felspar is by far the most abundant, some having good idiomorphic forms, while others show broken individuals. Augite is also abundant in medium-sized grains, which, however, have undergone considerable alteration, in some places being completely changed to epidote and chlorite. Calcite is abundant as an alteration product, and magnetite as an accessory constituent.

The rock bears a distinct resemblance to No. 120, but is relatively richer in felspar and may be considered to be a highly altered basalt.

No. 13.—Fine-grained dark igneous rock, with markedly porphyritic structure. From an exposure on Nevertouch Creek, near its junction with Kettle River.

Under the microscope, the rock is seen to consist of a rather fine-grained groundmass, in which are imbedded well-defined phenocrysts, which like the groundmass consist of plagioclase and augite. Many of the smaller felspar grains are untwinned, and all have undergone considerable alteration. Augite is quite abundant in almost colourless grains, showing much alteration to chlorite. It has a maximum extinction of 39°, which, with its other characteristics, determines it to be diopside. A few crystals which, from their general appearance and high double refraction, closely resemble olivine, are also present. Some biotite occurs in the slides, but is very much altered, now consisting largely of chlorite. A small amount of epidote is present as an alteration product, and ilmenite, which occurs associated with sphene, is abundant as an accessory constituent.

The rock is an augite andesite, or possibly, as suggested by the structure, some dyke rock of similar composition.

No. 14.—From the Gorge at the mouth of Canyon Creek. where it enters Nevertouch Creek.

"The rock formation on either side of the gorge is of igneous

origin, a fine-grained dark diabasic rock, inclined in places to be porphyritic in structure."

The collection contains two specimens from this locality, representing two different varieties of the same rock, one showing a massive and porphyritic character, while the other is scoriaceous.

Under the microscope, the rock is seen to consist of a microcrystalline groundmass composed of minute laths of felspar, showing a trachytic structure and often a fluidal arrangement. In the groundmass are included well defined phenocrysts of plagioclase, augite and biotite, also a few phenocrysts composed of a microperthitic intergrowth of two felspars, one of which may be orthoclase. Some of the plagioclase individuals are twined according to both the Carlsbad and Albite laws, which when examined by Michel Lévy's method were found to have the composition $Ab_1\ An_1$.

In the second section, which is a highly vesicular variety, the vesicles nearly all show a narrow border of what appear to be zeolites which are just beginning to form in the cavities. The biotite, in this section, is dark brown in colour and contains little black needles arranged in skeleton patterns, which probably consist of rutile derived from the partial decomposition of the mica. The groundmass of this section is relatively more abundant than the vesicles and it is therefore not a true pumice, though it approaches one in appearance.

The rock is very fresh ; and, from a comparison with the other rocks described, it would appear that this is a comparatively recent lava flow. It has the character and mineralogical composition of an andesite.

No. 17.—"Reddish-grey rock from the north side of Slate Creek, near its mouth."

Highly decomposed basic igneous rock, having the composition of an augite andesite.

Under the microscope, the rock is seen to possess a well marked porphyritic structure. The groundmass is microcrystalline, consisting of minute laths of felspar, which often show a fluidal arrangement, and a little chlorite and oxide of iron, representing alteration products of some ferromagnesian constituent. Through this are distributed large well defined lath-

shaped crystals of plagioclase now almost entirely altered to rhombohedral carbonates; also phenocrysts of some ferro-magnesian constituent now completely altered to a mixture of rhombohedral carbonates, quartz, chlorite and oxide of iron. The rock shows a few vesicles now completely filled with decomposition products, such as chlorite and calcite. A few well defined hexagonal crystals of fresh apatite of large dimensions occur scattered through the groundmass, also a few veins of calcite.

No. 8.—Fine-grained grey rock from Brewer Creek, Upper Kettle River.

"About one mile from the mouth of Brewer Creek and in line with the foothills, there is an outcropping of the solid rock formation exposed in the banks of the creek. The formation here seems to be chiefly granite, alternating with dykes of fine-grained basic volcanic rocks, and occasionally, apparently, with still more recent and very acid dykes."

The sample in question is taken from one of the acid dykes.

The hand specimen is a dyke rock, medium fine-grained and grey in colour.

Under the microscope, the rock is seen to be much altered and to be composed almost wholly of altered felspar crystals twinned according to the Carlsbad law, on account of which, as well as from the total absence of albite twinning, they were assumed to be orthoclase. Small narrow laths of biotite are abundant, which, however, have undergone considerable alteration, in most cases being changed to chlorite. Secondary quartz, associated with calcite and apatite, is also noticeable, and, as accessory constituents, magnetite and pyrite. The groundmass, which consists of small felspar individuals, also has a small amount of quartz, possibly secondary, distributed through it. There are a few vesicular cavities filled with zeolites.

The rock corresponds in character and composition to a minette.

No. 53.—"Porphyrite from Rebecca Mine, Rock Creek, west side of Kettle River, 4 miles above Rock Creek. Elevation 4,000′."

"The chalcopyrite is carried by a quartz vein which cuts this rock. Value of mineral, $22 per ton."

The hand specimen shows a compact fine-grained pale-greenish-grey rock.

Under the microscope, it is seen to be very highly altered and to consist of a trachytic groundmass of plagioclase laths interspersed with grains of epidote and chlorite, in which are imbedded larger individuals of plagioclase, and forms which have once been occupied by phenocrysts of some ferromagnesian constituent now entirely altered to chlorite, epidote, zoisite, quartz and calcite.

The rock is too much altered to enable a determination of its precise character to be made, but it is evidently some basic igneous rock allied to andesite.

No. 30.—From the country rock between West Bridge and Stuart's hotel.

Hand specimen shows fine-grained pink-coloured rock, in which may be distinguished phenocrysts of hornblende, biotite and plagioclase.

Under the microscope, the rock is seen to be composed of a microcrystalline groundmass of felspar and quartz, in which are imbedded phenocrysts of plagioclase containing inclusions of some alteration products; also biotite altered in many cases to chlorite, associated with which may often be seen sphene. There are also a few fresh-looking quartz individuals, and outlines now entirely filled with quartz, calcite, chlorite and epidote, which were once occupied by some ferromagnesian constituent, probably augite, as they often show forms indicative of that mineral. Magnetite and apatite are present as accessory constituents.

The rock is an altered andesite.

It will be seen from the foregoing descriptions that most of the rocks described are andesites or closely related rocks. No. 14 presents a striking contrast to the others in that, while they are much altered, it is fresh and has every appearance of being a comparatively recent eruptive.

The occurrence of native copper in No. 125 is interesting, and its secondary nature is very plainly shown. It has no doubt been derived from the chalcopyrite by reduction.

NOTES ON THE NESTING HABITS OF THE BROWN CREEPER AND HUDSONIAN CHICKADEE.

By L. McI. TERRILL, Montreal.

In an article on the Brown Creeper someone has observed that this bird searched for its food as if it had lost the one thing necessary to life, and ignored the onlooker completely in its endeavours to find it. Nevertheless, I had occasion, on July 14th of this year, to find a bird startled out of its monotonous occupation. Whilst walking through a piece of hardwood, interspersed with small clumps of evergreens, and bordering on a large cedar swamp, I heard a bird uttering peeps of alarm, and, on looking for the cause, saw a Brown Creeper in a very nervous state, flitting from tree to tree without thinking of its usual occupation. Thinking there was a nest, I started towards a likely-looking balsam stub, and, on striking the tree there was a great commotion at its base, whereupon several young creepers fluttered away in different directions. This was evidently their debut from the nest, and instinctively they flew to the nearest trees and ascending spirally, picking the tree at intervals with weak little pecks, commenced their tradional life search.

To return to the nest, I found that I had broken off a large piece of bark about two feet from the base of the stub, thus disclosing the nest, which was fastened to the loose bark with threads of spiders' silk. It was a very deep structure though necessarily much flattened (as the bark was only about three inches from the trunk at its widest) in the shape of an elongated one-sided wedge. It was composed of dead lichen-covered twigs of spruce, balsam and tamarac, thrown together in a very loose mass with a lining of shreds of the inner bark of balsam. Its outside depth measured eight inches, the diameter parallel with the trunk five, and the other diameter two and one-half. The bark and trunk formed the boundaries of the nest cavity, which was perfectly flat. The nest also contained one infertile egg, which was rather elongated, of a shining creamy white slightly flecked on the larger end with reddish flesh colour.

I counted six young birds which, with the infertile egg, made seven originally contained in the nest.

On July 22nd of this year, whilst tramping through a large cedar swamp, I became interested in the actions of a Hudsonian Chickadee. I watched it for some time searching for insects, when suddenly it disappeared behind a small cedar with a larva in its bill. I did not expect to find a nest, as the top of the tree was green, but, on going around on the other side, perceived a small almost circular hole with jagged edges, about twelve feet from the ground. On rapping the tree, the bird left and became very much excited, nervously flitting back and forth from the nest. Cutting away a portion of the wood, I found the nest to contain young a few days old, six of them, I think. The spot chosen for the nest site was about the best that could be found in the swamp, situated, as it was, on a small spruce knoll near by an ice cold spring which fed a small brook. The tree, as I mentioned, was still green at the top, but from the nest cavity down was decayed and hollow at the core. Returning some time after this, to give the young a chance to vacate, I found the nest to be about ten inches below the entrance hole, which was two inches in diameter. It was composed of particles of moss, lichens and strips of soft inner bark of the cedar, felted together with rabbit's and deer's hair.

MEETING OF THE BOTANICAL BRANCH.

The eighth meeting of the Botanical branch was held at the home of Dr. James Fletcher, Experimental Farm, on Thursday, May 21st. The meeting was called for seven o'clock instead of eight in order that the members might see the many interesting wild plants growing in Dr. Fletcher's garden, especially the violets, of which he has made a special study and which were then in fine condition. Among the interesting plants growing in the garden were *Erythronium grandiflorum*, var. *minor*, and *Claytonia sessilifolia* from British Columbia, which appeared to be thriving well. The variegated form of *Trillium grandiflorum*, mention of which was made in a previous number of THE NATURALIST, was also seen growing here and proved an interesting study, also *Syndesmon thalictroides*, and *Ranunculus fascicularis* from Hamilton, Ont. Most of the time was spent in studying the violets, of

which there was a fine collection. These had been grown in pots, so that each species might be kept separate, and were remarkably vigorous and full of bloom. A table was made ready in the house and twenty-nine pots were brought in from outside, where they had been plunged. A general discussion on violets and, on Dr. Greene's recent discoveries and descriptions of new species, preceded a more critical examination of the plants by Dr. Fletcher and the members present. Prof. Macoun said that it was very important in his opinion that, in describing new species, the new one should be compared with one that was better known, as a mere description was not of much assistance in determining a species.

Dr. Fletcher gave a very interesting address, and he had in the living plants such splendid object lessons that much information was obtained, which was impressed on the minds of those present. He said that, when he began collecting first at Ottawa in 1873, he was puzzled at the different forms of violet, which at that time all went under the name of *Viola cucullata*. He showed a sheet of dried specimens having four of these types which he had called at that time alpha, beta, gamma, delta, to separate them. During recent years greater attention had been given to the study of violets; new species had been made out of these forms and named. He said that, although these new species all had some distinctive characteristics, it was impossible to identify them at all times from one character. There was great variation in growth according to conditions under which the plant was growing; there was also great variation in the colour of the flowers. Violets will make fine flowering plants in one year from seed.

Some of the distinguishing characteristics of a few of the species of violets shown were recorded.

V. septentrionalis.—Flowers below the leaves, but prominently in view.

V. subviscosa.—Outline of lower petal prominently boat-shaped.

V. Fletcherii.—Flowers royal purple, very attractive. New leaves erect, acuminate, ciliate.

V. Macounii.—Flowers have a decided pinkish tinge. Petals narrow and all bearded.

V. Dicksonii.—The commonest violet. Petioles and base of petals bristly.

V. cucullata.—Easily distinguished from *Dicksonii* by its dark eye and in the spring being perfectly glabrous. Flowers always above leaves. Grows near spring water.

V. venustula.—Serration of leaf very distinct.

The following is a list of violets shown growing in flower pots, or as fresh specimens from the garden :

affinis,
do scabrous.
blanda,
cardaminefolia, (Aylmer, Que., type locality),
cognata (Manitoba),
crenulata (U.S.),
consors, (Nova Scotia),
cucullata (Ottawa),
do (New Brunswick,
do (Quebec),
do (Prince Edward Island),
Dicksonii (Ottawa),
do (Hamilton, type locality),
do var. *glabrata*,
elegantula,
Fletcherii (Ottawa, type locality),
Labradorica,
Deconteana,
leucopetala (type locality),
Macounii (Ottawa, type locality),
melissæfolia,
nesiotica,
nodosa (U.S.),
ovata,
palmata (U.S.),
papilionacea (U.S.),
prionosepala (type locality),
renifolia,
rostrata,
Selkirkii,
septentrionalis,
subvestita (type locality),
do (Nepigon),
do (New Brunswick),
subviscosa (type locality),
vagula (type locality),
venustula (type locality),

The members of the Club present at this meeting were Miss Lee, Dr. Fletcher, Mr. Campbell, Mr. Attwood, Mr. Guillet, Prof. J. Macoun, Mr. St. Jacques, Mr. W. T. Macoun.

W. T. M.

GENERAL EXCURSION TO CHELSEA.

The first general excursion of the season was held at Gilmour's Grove, Chelsea, on Saturday, the 16th of May, and proved to be one of the most successful meetings ever held under the auspices of the Club. Several hundred persons, including members of the Club and students of the Normal School, attended, and were escorted through the woods by leaders of the different branches. Great interest was manifested in the descriptions of the plants,

insects, and rocks, given as the objects were found in the open field.

In the way of botanical specimens, we have to mention a large collection of interesting violets. Along the river, the silver maple (*Acer dasvcarpum*) was found growing quite abundantly among the red maples. The former was easily distinguished from the latter by its more deeply cut leaves. The green alder (*Alnus viridis*), which is not found in many places about Ottawa, was common near the river bank.

Seventeen different kinds of butterflies were collected, the rarest species of which was *Thecla niphon*, taken by Mr. Arthur Gibson and also by Mr. A. E. Richard. Other species found by Mr. Richard were *Nisoniades juvenalis*, *N. icelus*, and *Brentis bellona*. Dr. Fletcher secured a specimen of a rare longicorn beetle, *Anthrophylax attenuatus*.

Numerous Batrachians were obtained in a shaded ravine beside a spring, such as the Wood Frog (*Rana silvatica*), the American Toad (*Bufo americana*); and Miss Wilson, of the Ladies' College, at this place, discovered a specimen of Tree Frog, of the species known as *Hyla pickeringii*, which species is of a fawn colour, and singularly marked on the back with an oblique cross. All the specimens of Batrachians were small. A specimen of Grass Snake (*Liopeltis vernalis*) was also captured by a boy and held up for inspection at the time when the addresses were given at the grove.

Leaders who attended the excursion were Mr. W. T. Macoun, the President of the Club, Prof. Macoun, Dr. Fletcher, Dr. Sinclair, Mr. A. E. Attwood, Mr. Arthur Gibson, Mr. Wilson, Dr. Guillet, and Mr. Andrew Halkett. When assembled in the pine grove, before returning to the city, the President called upon Mr. Wilson, Dr. Fletcher, and Mr. Halkett to address the assemblage concerning respectively the fossils, batrachians, and plants which had been found. The excursionists then returned to Ottawa, and numbers of the members and others have since been seeking to study out in closer detail the structure of special objects. All look back to that afternoon in the shaded woods and open field as a promising incentive in connection with the future work of the Club. A. H.

NATURE STUDY—No. IV.

BIRD STUDY.

By W. A. DENT, Whitby, Ont.

In connection with the widespread awakening of interest in Nature Study, some attention has been and is being directed to Birds and their habits. Birds are among the most conspicuous, attractive, and easily observed objects in Nature, and, when attention is once drawn to them, the student is led into other avenues of Nature Study which will be found pleasant and profitable to pursue. A fairly comprehensive and accurate knowledge of most of our common birds is more readily obtained than would at first sight appear possible, and many good books are now to be had which render identification comparatively easy. Of these Chapman's "Bird Life," with coloured plates, and Chapman's "Handbook of Birds of Eastern North America," are probably as good as any. These books are useful in identifying birds, and perhaps also as a guide to their study; but, to be of any value educationally, our further knowledge must come from a study of the living birds in their haunts and homes.

While children probably do not consciously love nature, they have a curiosity to know more of the living things they see about them, and there can be no doubt that if children were taught more of the things they wish to know and fewer dead uninteresting facts, better educational results would be secured.

A bird which is likely to be more or less familiar to children, particularly in rural schools, is the Bobolink, and a study of its life history will be found most captivating and instructive. The beauty of his plumage and the contrast with the duller dress of the female, his rollicking joyous song, his skill in concealing his nest, his extensive migrations, in the course of which he visits many countries, can be woven into many interesting lessons. The Meadow Lark is an expert decoy, and the sight of a bird endeavouring to decoy an enemy from its young never fails to arouse the most intense interest.

It is unnecessary, however, to leave bird study to those living in the country; for, in the town in which I am now writing, many

very interesting birds regularly make their homes. Omitting the commoner ones, I might mention the Great Crested Flycatcher, Least Flycatcher, Black and White Creeper, Canadian Warbler, Ruby-throat Hummingbird, Black-billed Cuckoo, Catbird, Screech Owl, Cedar Waxwing, Maryland Yellow throat. In addition to these, many marsh and shore birds, such as Grebes, Gallinules, Bitterns, Coots, Plovers, Sandpipers, and even Ducks and Loons, regularly nest and in spite of legal and illegal shooting seem to maintain their numbers fairly well. In addition to these there are, of course, many migrants, including Warblers, Thrushes, &c, which visit the shade trees and orchards during the spring and fall migrations. Indeed the number and beauty of these migrants is generally a revelation to those whose attention is directed to them for the first time. For the purpose of studying nesting and food habits, however, the ever-present English Sparrow will afford a convenient example and may be compared and contrasted with the Robin Every child knows a good deal about these birds in a more or less vague and indefinite way, and methods will readily suggest themselves to the teacher to make this vague knowledge definite and to cultivate a habit of accurate observation.

One of the important practical results which will follow the introduction of the study of birds into the schools, will be a more general recognition of their great economic value. To those who know and love birds and all nature, this is, it is true, by no means the greatest consideration ; nevertheless, it is undeniably one which appeals strongly to the popular mind.

One of the first questions which an appeal for the more general protection of birds will provoke, is almost certain to be : "Well : what good are they anyway ?" If we can suppress an expression of pity for the benighted condition of the questioner, we can produce an array of facts generally sufficient to convince the most sceptical, that the vast majority of birds are well deserving of our great efforts to encourage and protect them. A familiar example is the Meadow Lark. As far as known, the food of this bird consists entirely of insects, including many such as wireworms, cutworms and grasshoppers, which are distinctly injurious to growing crops.

The Meadow Lark occasionally winters in the province (though, for what reason, it is hard to imagine), and from an examination of the stomach contents of several specimens taken in the winter, it has been found that, even under stress of weather, they had not resorted to vegetable diet, but had succeeded in unearthing various grubs and beetles. The Meadow Lark is thus in everyway a decidedly beneficial bird in the agricultural districts where it makes its summer home ; yet, in spite of this and of the beauty of its plumage and of its clear ringing whistle, it not only receives no protection at the hands of the farmer whom it befriends, but, in many cases, either the birds themselves or their eggs or young are wantonly destroyed. A very slight knowledge of the habits of the birds would do a great deal towards preventing their destruction.

In connection with the recognition of the economic value of birds, a little study will do a great deal towards clearing up many false ideas concerning hawks and owls, which are usually subject to the most relentless persecution. A little study will show that while some hawks, like the Goshawk and Sharp-shinned Hawk, and some owls, like the Great Horned Owl and the Snowy Owl, are injurious ; nevertheless, the great majority of them are, not only not injurious, but even decidedly beneficial. A careful observation of the habits of the living bird by competent observers and an examination of the contents of thousands of stomachs afford the only satisfactory test of its economic value. In the case of hawks and owls, these methods have been carefully applied and go to show that most of them are of great ecomomic value.

The value of these birds lies in the destruction by them of very large numbers of mice, rats, squirrels, gophers, and other destructive vermin. A good illustration of the value of such an owl as the Long-eared Owl, is afforded by an examination of the pellets which collect beneath the roosting places. As nearly every one knows, an owl swallows its prey whole, and the indigestible portions, such as fur and bones, become matted into pellets and are disgorged through the mouth. In the case of a roost occupied by a Long-eared Owl for some weeks during November and December, 1902, about one hundred and fifty pellets were found. These pellets were about the size of a small mouse and contained on the

average about two skulls each, with other bones and fur. The number of skulls shows that during that time the owl had destroyed about three hundred mice.

It is probable that nearly all owls and hawks will take birds if they can get them ; but, that they habitually do so, is sufficiently disproved by the above mentioned methods of observation. Another good result which would follow a more general study of birds, would be a lessening of the wanton destruction of their nests and eggs. The habit of egg collecting was formerly very prevalent and is still sufficiently common to be a serious factor in the destruction of birds. It is unfortunate that many of our most valuable insectivorous and song birds are those which, from their habit of nesting near towns and in accessible places, are particularly liable to this form of persecution. The eggs of Bluebirds, Yellow Warblers, Goldfinches, Catbirds, Phœbes, Kingbirds, Woodpeckers, Swallows, and in fact of all those birds which are most valuable and worthy of protection, still find their way in large numbers to the pockets and other receptacles of the ubiquitous small boy. It should be the duty of every teacher to do what he can to prevent this. It is not sufficient alone to point out that it is against the law and punishable by fine or imprisonment, because, in order to make such a law effective, it is necessary to create a popular sentiment in its favor. Probably the most effective way to create such a sentiment is to call attention to the economic value of birds.

Aside from these very practical considerations, however, the study of birds has an educational value which is probably not exceeded by that of any other department of Nature Study. It should be borne in mind that the object of such studies is not the acquisition of technical knowledge ; but, as Dr. Fletcher has pointed out, "to train the mind" and to aid the learner to become "self-dependent." That is indeed a valuable system of education which, while accomplishing these important ends in the best possible way, also brings the student into close, even intimate, contact with his natural surroundings. If we "in the love of Nature hold communion with her visible forms," we have an unfailing source of interest and recreation which is of priceless value to those possessing it.

THE OTTAWA NATURALIST.

VOL. XVII. OTTAWA, SEPTEMBER, 1903. No. 6.

MY PET CROWS.

L. H. SMITH, Strathroy, Ont.

The first bird pet I ever owned was a member of the Crow family, a Jackdaw. This bird is a smaller species of Crow, and makes a most interesting pet. Of course my pet's name was Jack, and, when poor Jack died, as all pets do (and generally tragically), it nearly broke my heart. It was in my boyhood's days, in the old land, and I can see now the mournful procession of children in Jack's funeral cortege, all crying out of sympathy for each other, and also for me, who was Jack's master. What a sad day poor Jack's funeral was to me!

Of the many pets I have had in this country, none are so funny, so cunning, and so interesting, as our common Crow.

On a fine day in early June, 1901, with a friend I started out to hunt a crow's nest. We had a long tramp, and were not successful until we came upon two boys, and, on putting the question to them "Did they know of a crow's nest?" Yes, they knew of one, with five young ones in it, but there were five boys interested in it, and each boy wanted a crow. "Well, show me where the nest is, that I may see how large the young ones are; and, if they are ready to take, I will make some arrangement with you to let me have them." They took us to the nest; one of the boys climbed the tree and held up one of the young birds, and I saw that it was nicely feathered and just the right age to take to rear. "Now, boys, what will you take for your crows?" Oh, they would each take ten cents I expected a higher demand, so closed at once, and ordered the boy who was in the tree to bring down all the crows in his handkerchief, which he did "Now, boys, who besides yourselves are in the partnership in this crow's nest?" They named three others, and I said "Here is your 10c. each for

your crows ; tell the other boys to come to my house and get ten cents each for theirs ; or let each take his crow, just as he pleases." This was, I thought, fair dealing, and, as I had bought out two shares, I felt sure of two pets, which was really all I needed.

When I arrived home with my birds, which I carried in my handkerchief, my wife asked me : "What in the world are you going to do with five crows ?" "Oh," I said, "they do not all belong to me, there are some boys who have an interest in them, and I guess will soon be after them." And I was not mistaken, for when it became known to the Crows' Nest Company that I had taken the crows, the stockholders were soon after me. For several days after I got the crows, when my wife saw boys coming to the house, she would say : "I guess it's some more of your crow boys."

One boy took his crow, the others I paid off as they came along, ten or fifteen cents, just as I could make the bargain. I did not keep a Crow debit and credit account, so do not remember how many shares I bought out ; but, when congratulating myself that I held all the stock, a boy came along ; he proved to be one of the original shareholders that I had bought out. He said his brother "owned one of the crows," and, as he was sick in bed and unable to come, he had sent him (the speaker) as his representative to demand ten cents, which I duly handed over ; though I never inquired whether that ten cents ever reached the sick boy.

Crows are omnivorous, are great feeders and easy to raise. I took a box about ten inches square and four inches deep ; in this I made a nest of soft hay, in which the birds, when young, and before they were able to perch, would sit ; and, their droppings being ejected outside, like from their natural nest, they were kept clean and healthy. I fed them largely on milk and bread, with (when the birds were quite young) some hard-boiled eggs mixed in it, raw beef and an occasional worm. Almost anything I would eat myself (no allusion to the worm diet intended), did not come amiss to them, and the quantity of food they consumed, when young and growing, would surprise anyone who never raised young crows. The secret is, Feed little and often.

After settling with all the boys who had an interest in my

crows, I had four birds, one of which I gave to a neighbor boy, and was sorry for it afterwards, for he neglected it and it died. One got hurt and came to nothing; but the other two grew to be beautiful sleek birds, and became great pets. They would follow me anywhere and everywhere, and I had to give them the slip in order to be able to get off the premises at any time when I did not want them to go with me. When I went for a stroll or to take my dogs out for a run, they always went along; the distance I went made no difference. They would fly after the dogs, who knew them and would not molest them; return, alight on my hat or shoulder, take another flight, and so on; they as thoroughly enjoyed a tramp through the woods and fields with me as my dogs did. I never tried to see how far they would follow, but my rambles would often be a round of several miles.

When wild crows would see them when we were on our rambles, they would sometimes come to them, but my pets did not care for their company, and, when the wild birds saw the tame ones alighting on my hat and frolicking with the dogs, they would fly off. I suppose they were wondering at such uncrowlike behavior on the part of crows. My crows became very friendly with the dogs, would feed with them and steal tid-bits out of their supper-pan, and, when I would play with my dogs by throwing a ball for them to fetch, the crows would fly towards the thrown ball, as the dogs would run, and return to me, as all the dogs would do when one of them had picked up and retrieved the ball. They seemed to enjoy the fun as much as the dogs did. When I was not about the premises, they spent much of their time by the kennel yard in the dogs' company.

These two birds were sleek, handsome fellows, and were very much attached to me, although they always were quite reserved with strangers, whom they never allowed to take any liberties with them, or even touch them, while I could caress them and pet them any way I liked. They would go to sleep resting on my knee, when I would be sitting in the garden, and never appeared to be so happy as when with me. While they were both beautiful birds, so glossy black and healthy as wild birds, still I could notice a slight difference; one was just a little more perfect bird, a little more beautiful specimen than the other, and, had not one died some

time before the other, I should have had opportunities of studying the character and individuality of each. They were very fond of a bath, and would dash and splash in the water pan which I always left in the sun for their convenience. When the day was fine and warm, they never missed their bath. They drank slowly, much as chickens do.

A pair of Kingbirds for several seasons have had their nest in my garden, and they used to persecute my crows most shamefully. They would fly after the crows, alight on their backs, and peck at them. It was some time before I could satisfy myself that the kingbird actually rested on the crow's back when attacking him: his (the kingbird's) wings would always be extended and elevated, and fluttering to enable him to keep his balance; but I felt sure that his feet were always on the crow's shoulders when he attacked the latter. The kingbirds were the only creatures around my premises of whom my crows were afraid, and they certainly lived in bodily fear of them.

One morning I found one of my crows lying near the barn wall, quite dead. I have no doubt he flew against the barn in terror trying to escape from the kingbirds. I was very sorry, as I was now left with only one pet; he missed his companion, and kept my company and that of the dogs, more than ever. I felt sorry for him in his loneliness.

In September I went to Manitoba. I was away a month. Almost the first thing I asked for on my return, was my crow. My people had only bad news to tell me of him; he had been going away a good deal, and on one or two occasions had stayed away for two days or more; he seemed, in fact, to have lost regard for them and love for his home, etc. I went into the garden and called him; he flew straight to me and alighted on my shoulder. He commenced pecking, in a bibbling way, at my ear, and chattering all the while; the bird was overflowing with joy to see me, and stayed by me and with me the rest of the day.

A pet crow I had the year before was very fond of having his head scratched, which operation I used to perform with my finger. My wife used a small piece of chip or stick for the purpose, being afraid of bird-lice creeping on her. He would follow her until she picked up a chip, when he would hold his head in position to be

scratched. On one occasion he carried a chip to her, which of course she took and used for the purpose indicated.

As a bird student, I will not say what can be taken out of these two episodes. Evidently, my pet was delighted to see me back after a month's absence, though what he said to me, crows alone could tell. The bird which carried the chip, might have done so with the intention of getting his head scratched with it, and he might not. We cannot get at what the birds know and what they think.

There is one objection to keeping pets, it is that they nearly always meet with an accidental, and often a tragic death. One morning in winter I called my bird to his breakfast, and he failed to respond. I never saw him after. He used to roost in the trees by the house, and I blamed the big brown owl for robbing me of the most lovable pet I ever had, and thus adding another to his long list of murders.

John Burroughs, in the "Atlantic Monthly" for March, 1903, in a paper on "Real and Sham Natural History," handles Seton Thompson and Rev. William J. Long without gloves. He ridicules some of the stories in Thompson's "Wild Animals I have known," and calls the writer of "School of the Woods" "Our Natural History Munchausen." I am not prepared to take sides. I think there are stories in "Wild Animals I have Known" which had better have been omitted or written differently. Long says a partridge can count eleven; Burroughs scouts the assertion. Who is to decide?

I might have drawn on my imagination, and said much more about my pet crows than I have done.

There is a mystery surrounding animal life which we cannot read, cannot interpret and cannot understand. I think, though, that one can get a little nearer the soul of a wild animal by making a pet of it.

WINTER GROWTH OF A WATER LILY.

WALTER S. ODELL.

When I uncovered my aquariam in my yard to-day (30th March, 1903), the water at one end was not frozen, the other end was covered with ice varying from thin to three inches thick at the farthest end. I was surprised to find that a Water Lily, *Nymphæa chromatella*, had two partly grown leaves, one smaller leaf and four curled up leaves ready to unfold, and two flower buds, on the surface of the water, while just underneath was a leaf curled up, not so far advanced in growth. One bud was badly decayed; the other was small and rose above the surface of the water about one and one-half inches.

With this plant are several other water lilies, also Nelumbiums, *Calla palustris*, *Cabomba*, &c. Last autumn the leaves of all these showed natural decay, except the *Nymphæa odorata rosea*, which had six or eight very large vigorous cordate leaves mottled with dull red, and a nearly mature flower bud, at the surface of the water. This spring all these large leaves and their stems had decayed and disappeared, while in their stead were the young leaves and bud before mentioned. The *C. palustris* started a shoot three inches above the water before being frozen in the surface ice, but had no growth when covered last fall. No other plant life was visible there.

The aquarium, measuring inside 14 in. x 7 in. x 2 ft., was filled with water to the brim late last fall before frost; a layer of boards was placed over it, then tar paper with overlapping edges; about a foot of wet manure was placed on this, while for a roof over all, slanting boards covered with tar paper to keep off all rain completed the shelter. When uncovered this spring, the manure was frozen to the boards and possibly had frozen solid. Where the ice was thickest the top boards were about four feet above the water.

It seems strange that the *N. odorata rosea* should grow and have natural-colored leaves in the dark, during winter, instead of the pale light yellow leaves one would naturally expect to find on plants growing away from sunlight; or that a plant should grow at all with ice on the surface of the water. No water lilies start in the Rideau River where the water is shallow and consequently warmer, till vegetation is well advanced on land everywhere.

REPORT OF THE ENTOMOLOGICAL BRANCH, 1902.

(Read at meeting of Club held Feb. 10th, 1903.)

The entomologists of the Club although few in number have been actively engaged during the past season, and a fair number of captures rewarded their efforts. Valuable work has been done in breeding and working out life-histories of Lepidoptera. The most successful collector has been Mr. C. H. Young, who has added several species of nocturnal Lepidoptera to the local list. His collections have been made at Hurdman's Bridge, near his residence, and at Meech Lake, P.Q., in the Laurentian Hills. Mr. Arthur Gibson has continued his studies on the Tiger Moths of the genus *Apantesis*, and has made some interesting discoveries, the results of which will soon appear in print. Dr. Fletcher and Mr. Gibson have reared from eggs several species of insects, the eggs of which have been received from correspondents, or collected in the Rocky Mountains. Among these, perhaps the most interesting are *Erebia Disa* (eggs from Mr. N. B. Sanson) and *Nemeophila petrosa*, from Banff in the Rocky Mountains; *Nemeophila Selwyni* and *Argynnis triclaris* from Nepigon; *Antarctia rufula*, from eggs received from Mr. J. W. Cockle, of Kaslo, B.C. Mr. Young also has been successful in rearing local species from the egg and has added many fine series of specimens to his collection of inflated larvæ.

Mr. A. E. Richard has made an important addition to the local butterflies in the interesting little satyrid *Cœnonympha inornata*.

Mr. Harrington has devoted much time to Diptera and has added many to previous records of the flies found at Ottawa.

In addition to the work done by the entomologists at the Club general excursions, many sub-excursions were held during the summer, and regular meetings of the Branch are being held during this winter, where short papers are read and free discussion takes place on all matters connected with this branch of research. Much good has resulted from these reunions in stirring up enthusiasm and in helping the members to settle points of identification which are troublesome when students are working alone. At one of these meetings, we were favored with a visit from Mr. J. D. Evans, of

Trenton. The orders which have received most attention in the past are the Lepidoptera, the Coleoptera, the Hymenoptera, the Diptera, the Hemiptera, and the Odonata. The leaders would be glad to see more work done in the Odonata and the Orthoptera, insects of much economic importance, the former from their predaceous habits of feeding on other insects, particularly mosquitoes, and the latter from the injuries they do to crops.

Mention may be made ot the following captures during the past year—nearly all of which are additions to the Ottawa lists.

LEPIDOPTERA—

Cœnonympha inornata, Edw. Near the Rifle Range, June 14. (Mr. A. E. Richard.) The same insect is reported by our Montreal member, Mr. H. H Lyman, as having been taken near Montreal by some of the members of the Montreal Natural History Society.

Pieris rapæ, L., var. *nov-angliæ*, Scudder. This is the rare yellow variety of the Common White Cabbage Butterfly. (A. Gibson.)

Feralia major, Smith April 20. (Fletcher.)

Hepialus mustelinus, Pack. (Gibson, Young.)

Chytonix sensilis, Grt. Meech Lake, Q. (Young.)

Semiophora youngii, Smith. Mer Bleue. Sept. 18. (Young, Gibson.

Agrotis genicula, G. and R. June 9. Meech Lake. (Young.)

Noctua jucunda, Walk. July 26 " "

" *rubifera*, Grt. July 25. " "

Porosagrotis mimallonis, Grt. Sept. 3. " "

Carneades fumalis, Grt. Sept. 3. " "

" *velleripennis*, Grt. Aug. 25. " "

Hadena nigrior, Sm. June 14. " "

" *cariosa*, Grt. July 16. " "

" *atgens*, Sm. Sept. 12. " "

Hydræcia inquæsita, G. and R. Sept. 8. Ottawa. (Young.)

" *cerussata*, Grt. Sept. 8. Ottawa. (Young, Fletcher.)

Macronoctua onusta, Grt. Sept. 29. (Fletcher.) This has also been taken at Montreal by Mr. Winn, and at Belleville by Mr. Evans.

Tæniocampa oviduca, Grt. May 26. Meech Lake. (Young.)

" *culea*, Gn. May 31. " "

Scopelosoma devia, Grt. April 22. (Young.)
Xylina fagira, Morr. April 16. (Young.)
" *ferrealis*, Grt. Sept. (Gibson.)
Pseudolimacodes littera, Gn. June. (Gibson, Young.)

In addition to the above, it may be mentioned that the Birch trees in this vicinity were again this year much defoliated by the Birch-leaf Skeletonizer (*Bucculatrix canadensisella*, Cham.) and that columbines in gardens were considerably disfigured by the unusual numbers of the caterpillars of the skipper butterfly *Nisoniades lucilius*, Lint.

HYMENOPTERA—

The Hymenoptera of Ottawa, as compared with these insects in other parts of Canada, are comparatively well worked up ; but there is much work in this very important order, waiting to be done by some specialists. Mr. Harrington has large and valuable collections in most of the sub-orders and is constantly naming material from all parts of Canada. The same may be said concerning the Diptera and the Hemiptera.

The following Hymenoptera are worthy of mention here :—

Spilomena pusilla, Say. A small wasp, new to the Ottawa list. (Harrington.)

Metopius pollinctorius, Say. (Harrington.)

Anoplonyx canadensis, Hrgtn. A new species described from Ottawa. (Harrington.)

Taxonus nigrisoma, Nort. The larva rather injurious from its habit of boring into apples to pupate. (Fletcher.)

COLEOPTERA—

Xyloryctes satyrus, Fab. (Fletcher, Harrington.)
Bellamira scalaris, Say. " "
Anthophylax attenuatus, Hald. Chelsea. (Fletcher.)
" *malachiticus*, Hald. " "
Pselaphus Erichsonii, Lec. (Harrington.)

JAMES FLETCHER,
W. H. HARRINGTON.
ARTHUR GIBSON.
C. H. YOUNG.

SUB-EXCURSION.

A sub-excursion of the Ottawa Field-Naturalists' Club was held on Saturday, June 20th. It was the first fine day for over a week. The few who took part in this outing, enjoyed it very much. The meeting-place was at Victoria Park; but it was some minutes after three before a sufficient number of members were assembled. As there were so few present, it was decided to have no after-speeches; and we were soon divided into groups, botanical, entomological, etc. One of the first specimens to attract the attention of the botanical group was the Wood Nettle. And not far off from it was seen growing the natural antidote to its sting, the Bitter Dock. In the same rich damp soil were found several other interesting specimens: the Fringed Bindweed with its racemes of white flowers and the minute cilia at its joints, the Honewort with its irregular umbellets of tiny white flowers, the creeping Hog Pea-nut, hardly yet in flower; but we wander on, seeking for rarer species. Many a treasure of earlier excursions is now passed by as common, or is scarcely recognized, now that it is seed-bearing, such as the Mitrewort and False Mitrewort, the Jack-in-the-pulpit, the Star-flower, the Painted Trillium, and several species of Violet, and of the more common Crowfoots.

We cross some open fields and see some of the agricultural weeds: the Common Milkweed with its drooping umbels of sweet-scented purple flowers, the Common Gromwell, which is recognizable all through the winter by its ivory-white sessile nutlets, the Common Hound's-tongue, with its barbed nutlets, by which it is so often carried away unconsciously by man and by beast. Then there are some prettier weeds, such as the Ox-eye Daisy and the Tall Buttercup. But the weeds are too numerous to be all recorded, and we pass on. "We may find some interesting specimens by that stream," says our leader. And, true enough, each of us adds to his collection something interesting. There are two Bedstraws, the Rough and the Sweet-scented; in the marsh is the Bur-weed, a close relative of the common Cat-tail; the Common Elder, which flowers rather later than the red-berried one, was there with its flat cymes of a heavy sweet scent. The

Sweet Viburnum was there in berry. Farther on, we found its cousin, the Arrow-wood, with its maple-like leaves.

But the greatest reward of our search was yet to find. It was not the occasional specimens of the Wild Strawberry, which were not preserved for later examination, nor the small prickly fruit of *Ribes Cynosbati*, which we willingly left to some children to gather, only warning them that the fruit was still green, nor the Hazelnut with its long cylindrical beak. No. The most valued prize gathered that afternoon was a plant of no known use at all, a leafless parasite. But this plant was rare. It was unknown to all of us. It had a single flower on its naked scape ; but it was a pretty flower, of pale purple colour with some yellow marking in the throat. Several specimens were found in the immediate neighbourhood, and each of us were able to take away one or more. Afterwards we learned that it is the One-flowered Cancer-root [*Aphyllon* (*Thalesia*) *uniflorum*], of the Broom-rape family.

Another very interesting botanical find was the Partridge-berry in flower. This pretty little trailing vine, with its evergreen leaves variegated with whitish lines and its scarlet berries, may be found both in autumn and spring time, but it is only for a comparatively short season in June that it remains in flower.

A much commoner flower, but beautiful with its rosy markings, is the Spreading Dogbane. It grows abundantly along the borders of thickets. Its numerous, tiny, rose coloured flowers make it an attractive object as it grows. But its milky juice is not pleasant on one's hands, nor does it revive so readily in a vase as those plants do whose juice is more watery.

However, time flies by, and so we bring our excursion to a close. There is left many another interesting specimen to be gathered, or to be studied, from trees, shrubs and herbs. And next time may there be many other enthusiastic naturalists to join with us in these pleasant Saturday afternoon excursions !

E. BLACKADER.

ORNITHOLOGY.

HERRING GULL'S EGGS.

On the 7th June of this season I collected on a small rocky island in Trout Lake, in the Parry Sound District, two eggs of the American Heron Gull (*Larus argentatus Smithsonianus*, Coues. The nest was composed of moss, pine needles, small sticks, wild hay, and lichen : its contents being these two eggs, which when blown were found to be fresh. Their ground colour is brown gray with greenish cast, one being somewhat lighter than the other ; and they are spotted and blotched with light purplish gray and sepia. They measure respectfully $2\frac{1}{16}$ ins. x $1\frac{7}{8}$ ins. and $2\frac{3}{4}$ x $1\frac{7}{8}$ ins.

ANDREW HALKETT.

A SELF-HEALING WOUND.

I once shot a wild pigeon that previously had had its breast pierced through and through by a shot, and on each side the wound was covered as if by a neatly applied gum and down plaster as symetrically round as the hole itself and not quite as large as a 25 cents piece. Those plasters could be scraped off only by the use of a knife, and when removed they left to the view, on both sides, a healthy looking and rapidly healing, though still open, wound.

EMERY PERRIN.

ENTOMOLOGICAL SOCIETY OF ONTARIO.

The annual meeting of this important society is to be held in Ottawa on Sept. 3rd and 4th next, and is to be followed by a field day on Saturday 5th The meetings are all open to the public, and the members of the Ottawa Field Naturalists' Club are specially invited to be present, to contribute papers and to take part in the discussions. The day meetings will be held in the Board of Trade room, 46 Elgin st., and the evening meeting on Thursday, in the large assembly hall of the Normal School. At this latter meeting Prof. W. Lochhead, of Guelph, will deliver his inaugural address "The Progress of Entomology in Ontario," and Dr. L. O. Howard, U. S. Entomologist, of Washington, will give an address on "The Transmission of Yellow Fever by Mosquitoes."

NATURE STUDY—No. V.

Summer Course at Norway Beach.

A. E. Atwood, M.A.

Norway Beach Park is situated on Norway Bay, an arm of the Ottawa, about forty miles up the river from the capital. During the past two summers, short courses of recreative nature study have been given at the Beach. This sketch is intended as an informal record of a few features of the free-and-easy two weeks' course during last July.

The work was characterized by earnestness without seriousness ; it was scientific without being technical ; it was practical, yet not exacting. The true, the beautiful, and the good constituted a guiding trinity. Any truth that illustrated the unity of nature, any beauty of form and especially beauty of adaptation that revealed itself, and Nature's lavish bounty in the endless variety of her gifts to man, were emphasized whenever an instance occurred.

With the object of leading the students to appreciate scientific nomenclature, they were asked to submit from time to time specimens of plants whose popular names are misleading. The response to this request is indicated by the following list, in which the unscientific part of each name is italicized : sweet *fern*, reindeer *moss*, prince's *pine*, club *moss*, *Canada* thistle, mountain *ash*, and evening *primrose*. In this connection it is surely pardonable to remark that knot *grass* is not grass.

The boys and girls who attended, were requested to remember the scientific name when easy and etymologically suitable. In a review a boy was asked to name the genus to which the clovers belong. There was no reply. "Try," prompted a clergyman encouragingly. "*Trifolium*," was the immediate response.

"Do you know the classical name for the maple?" "Ay, sir." "Give it please." "*Acer*.'

In his opening address the leader expressed the opinion that it would be possible to find five species of maple in the locality and he offered to compete with the rest of the school in finding them. One young woman submitted a spray of the Maple-leaved Viburnum Her attention was directed to its fruit, and thus she was

convinced of her error, but even the youngest member of the class felt the appropriateness of its name,—*Viburnum acerifolium.*

A few days later the Purple-flowering Raspberry was the subject under examination. After two or three other brambles had been named, the students were told that all belonged to the genus *Rubus.* They were then asked to propose a suitable specific name for the plant under immediate consideration, and *Rubus acerifolius* was at once suggested—a more satisfactory name perhaps than *Rubus odoratus*, by which it is known to botanists.

Attention was then called to the fact that the fruit of the Raspberry consists of an aggregation of drupelets, each of which is itself a perfect fruit,—*more than one fruit from one flower.* The fruit of the Partridge-berry (*Mitchella*) has on its surface two depressions the significance of which was discovered by a bright boy who suggested that each pit was the place where a flower had been,—*one fruit from more than one flower.*

Another problem was to interpret the significance of the fleshy teeth of the fruit of the Creeping Wintergreen (*Gaultheria*). After the capsule had been dissected out, it was made clear that these teeth were the lobes of the enlarged calyx. The leader then asked the students to name a fruit cultivated for the sake of its fleshy calyx and was surprised to have a little girl give the apple as an example. On being questioned as to the source of her information, she said that Mr. Macfarlane had the year before called the attention of the students to the fact. She had not forgotten it though twelve months had elapsed.

Another instance of the lasting impressions made by the nature study method of teaching was furnished by a girl of twelve who was asked to tell how a tree should be planted. She described minutely the method illustrated a year ago by Mr. W. T. Macoun, who gave a practical demonstration by planting a little pine tree in the auditorium during the course of his lecture.

There was also a sequel to Mr. R. B. Whyte's talk of last year on the shrubs of Norway Beach, when the characteristics of Poison-ivy were specially emphasized. Some time after, two young men of that locality were picking stones in a field when they came to a heap over which trailed Virginia Creeper. One of them said, "Rather than run the risk of being poisoned, we will

leave those stones there." "This is not Poison-ivy," said the other, as he seized the shrub and drew it to one side, "I attended Norway Beach summer school, where I learned that this is Virginia Creeper, for each leaf has five leaflets, not three as Poison-ivy."

As mosquitoes were a feature in the environment, they also received a little scientific attention. The malaria-inoculating genus (*Anopheles*) was described, and the students were asked to bring specimens on the day following. The shaded wings and pointed pose of the body when the insect is at rest, betray the *Anopheles*, whose long palpi, if closely examined, furnish a corroborative means of identification. It is rather difficult to kill a mosquito without injuring it as a specimen ; indeed, the writer spent half an hour that evening in the attempt to do so. At last one was secured, and he proceeded to examine it with a magnifying glass. So life-like was the corpse that a little boy who saw it, exclaimed : "There's a mosquito!" and immediately crushed the dearly-bought insect between his finger and thumb.

Someone has said, "Punctuality is the thief of time." In order that those who arrived at the auditorium punctually, should not have their time wasted, an opportunity was given them of examining objects under a microscope while the tardy ones were on the way. On one occasion a drop of blood was required, to obtain which, all the mosquitoes present were invited to "bite." As none took advantage of the invitation (and certainly mosquitoes have reason to be suspicious of scientific inquirers), a little girl volunteered to shed her blood in the cause of science. She did so by opening a recent wound on one of her bare feet. The blood corpuscles were soon revealed, and the students present realized how small the microbe of malaria must be when they had been informed that a colony may develop within one corpuscle.

While due emphasis was given to the fact that botanical classification is based on the structure of the flower, the leader encouraged the student to give attention to relationship as revealed in other organs. For instance, after the Prince's-pine (*Chimaphila*) had been made a subject of analysis, the class was asked to bring other plant species which they might reasonably expect to belong to the same family. Trailing Arbutus, Bearberry, Creeping Win-

tergreen and Pyrola were submitted, their low-growing habit and leathery leaves being the characters of similarity.

In like manner, members of the Grass Family were to be identified by the two-ranked leaves whose sheaths are split on the side of the stem opposite the blade. From this character, wheat and oats were recognized as grasses. The former was named as that member of the Grass Family that contributes most food for man. A question as to the staple food of the people of China and of India led the class to see that the pre-eminence belongs to rice. The leader had to tell them that rice is a grass, as none had ever seen it growing. In Nature Study our great aim is to walk by sight, not by faith; but it is often necessary and quite allowable to get information second-hand, especially when it is based on intelligent first-hand knowledge. We thus learn from the researches of others that the Grass Family stands first and Pulse Family second in the amount of food contributed to man. It was left as an undecided question as to the order of plants that has the third place, but the member of the class who was regarded as the oracle, declared that either the Rosaceæ or Solanaceæ occupy this grade.

The centre of interest of the Pulse Family was the nodules that are found on the roots of the different species. In one particular most plants resemble Coleridge's Ancient Mariner who was perishing with thirst though there was "Water, water, everywhere." Plants grow in an ocean of nitrogen, which element they require for their proper development. Though there is, in the atmosphere, nitrogen, nitrogen everywhere, the plants are unable to assimilate it in the free state. Now the tubercles on the roots of leguminous plants are the homes of minute organisms called Rhizobia, which are free-nitrogen-assimilating bacteria, and by whose instrumentality these plants are able to incorporate the necessary nitrogen A pedagogical moral to be drawn from the foregoing, is that teachers of plant study should encourage their pupils to dig for their information,—to examine the root as well as the stem and the leaves.

THE OTTAWA NATURALIST.

VOL. XVII. OTTAWA, OCTOBER, 1903. No. 7.

NOTES ON SOME CANADIAN SPECIMENS OF "*LITUITES UNDATUS.*"

J. F. WHITEAVES.

One of the rarer fossils of the Black River limestone in the Province of Quebec, is a spirally coiled cephalopodous shell that was identified with *Lituites undatus* by E. Billings many years ago, and that certainly corresponds very well with one of the specimens that Professor James Hall has figured under that name. Specimens of this fossil, collected at the Falls of the St. Charles River at Lorette, also on the Lac Ouareau River, north of Joliette, by Sir W. E. Logan in 1852, and three miles west of Napierville, south of Montreal, are still labelled with that name in the Museum of the Geological Survey. Most of these specimens are not more than two inches in their greatest diameter.

But it has long been suspected that Hall has unintentionally included more than one species under the name *Lituites undatus*, and it is obvious, from his figures, that none of these are referable to Breyn's genus *Lituites*, as now understood.

The following is a brief summary of the literature bearing on this question :—

1842. On page 394 of the "Report of the Geology of the Second District of New York", by Dr. Ebenezer Emmons, two fossils are rather roughly figured under the name *Inachus undatus*. There is no detailed description of this species, and all that is said of it is that "this remarkable fossil is found at Watertown in the black limestone. It is rare. Casts sometimes occur which are smooth."

1847. In the first volume of the Palæontology of New York, Hall described some specimens from the same locality, which he evidently believed to be conspecific with Emmons' species, under the name *Lituites undatus*, and figures four of them on Plates XIII and XIII *bis*. Hall,

however, quotes *Inachus undatus* as a manuscript name of Conrad's, who was then the State Palæontologist, and states that "this fossil is known to me only as occurring at Watertown, Jefferson County, in the Black-river (or '*seven foot tier*' of) limestone, being unknown in any higher position."

1857. About this date a few specimens from the Black River limestone at Lorette and other localities in the Province of Quebec, were identified with *Lituites undatus* by E. Billings. In this year Professor E. J. Chapman expressed the opinion that these and other specimens of *L. undatus* should be referred to the genus *Cryptoceras*, d'Orbigny, but it has since been shown that this name is preoccupied.

1863. In the Geology of Canada, page 156, *Lituites undatus* is recorded as occurring in the Black River limestone on the St. Charles River, at St. Ambroise, four miles north of Lorette.

1883. Professor A. Hyatt, in his "Genera of Fossil Brachiopoda" published in the twenty-second volume of Proceedings of the Boston Society of Natural History, refers all the specimens that Hall figured as *L. undatus* to Conrad's genus *Trocholites*, but has since abandoned this conclusion. The siphuncle of *Trocholites*, it may be mentioned, is either central or near the dorsum. In this paper, also, Hyatt proposes and briefly characterizes the genus *Plectoceras*.

1884. Professor Gustav Lindström, in his memoir on the Silurian Gastropoda and Pteropoda of Gotland, says that the generic name *Inachus* Hisinger (1838) cannot be used for a mollusk, as it is pre-occupied in Crustacea, and that it "consisted of three species, of which one, *I. sulcatus*, is a *Pleurotomaria*, *I. angulatus* is an *Oriostoma*, and *I. costatus* a cephalopodous shell, probably a *Trochoceras*."

1891. Dr. A. H. Foord, in the second part of his "Catalogue of the Fossil Cephalopoda in the British Museum," claims that Hall has figured more than one species under the name *Lituites undatus*, and describes one of these as *Trochoceras Halli*. The types of Dr. Foord's species are two apparently rather small specimens, that do not show the shape or position of the siphuncle, from the Black River limestone at Lorette; but these are stated to be the same as the specimen of *L. undatus* figured by Hall on Plate XIII, figs. 1 and 1*a* (cæt. excl.) of the first volume of the Palæontology of New York.

1894. Hyatt, in his "Phylogeny of an Acquired Characteristic," published in the thirty-second volume of the Proceedings of the American Philosophical Society, refers all the specimens that Hall figures as *Lituites undatus* to Schroeder's genus *Eurystomites*, but says that "there are several species usually placed under the name *Lituites undatus*." He makes no mention of Foord's *Trochoceras Halli* in this connection, but gives the name *Plectoceras obscurum* to a supposed new species, which he does not figure, and of which all that he says is that it "occurs in the Black River fauna in New York and is quite com-

monly mistaken for the young of *Eurystomites undatus;* but it has an open gyroceran spiral, the siphuncle is nearer the venter, and the costæ are more highly developed and more prominent, and have a distinct character from those of that species."

In 1878, Mr. T. C. Weston visited Lorette, on behalf of the Geological Survey, and succeeded in obtaining for its Museum a fine series of large and unusually well preserved specimens, that agree very well with Foord's description and figures of *Trochoceras Halli*, but that give some additional information in regard to that species. Some of these specimens, which measure a little more than three inches in their maximum diameter, are apparently adult shells, with the apertural margin well preserved. Their coiling shows only a slight and scarcely trochoceran inflection, and is almost if not quite gyroceraconic The lip of each of the presumably full grown specimens is thin, simple, and parallel to the obliquely flexuous ribs, or narrow rib-like plications, and minute ridges, that cross the outer whorl obliquely, and is consequently curved convexly forward on each side, and both deeply and concavely backward on the venter, which is broader than the dorsum. The sutural lines are nearly straight, and the siphuncle is cylindrical, ventral and marginal.

The resemblance between these specimens from Lorette and the *Nautilus Jason* of Billings, the type of Hyatt's genus *Plectoceras*, is very striking, and the close resemblance of similar specimens from Lorette, etc., to *N. Jason*, had not escaped Mr. Billings' notice. Indeed the only practical difference between these species would seem to be that the volutions of *N. Jason* are a little more losely coiled than those of *Trochoceras Halli*, and that the siphuncle of the former is placed at a short distance from the periphery or venter. In the present state of our knowledge of this question, the writer is inclined to think (1) that no specimens that exactly correspond with the *Inachus undatus* of Emmons have yet been found in the Province of Quebec ; (2) that all the specimens from the Black River limestone of that province that have been referred to *Lituites undatus* are *Trochoceras Halli* ; and (3) that the last named species is a *Plectoceras* and should therefore be call d *Plectoceras Halli.*

It may, however, be stated that, in a letter dated August 4th,

1898, Professor Hyatt expressed the following opinion in regard to *Trochoceras Halli*: "Foord's species is clearly in my opinion a species of *Sphyradoceras*, in which I now include also my genera *Peismoceras* and *Systrophoceras*. This genus and *Plectoceras* are now close allies and appear together in my M.S. of the article Cephalopoda in Eastman's translation of Zittel's Text-book of Palæontology, under the family name Plectoceratidæ. What you say about the siphuncle being ventrad of center, etc., if your specimens are also heavily annulated from a comparatively early stage and trochoceran in form, or even if comparatively symmetrical, seems to me to place them better in in *Sphyradoceras*." Yet, in the printed text of that article, which embodies Hyatt's latest views on the Cephalopoda, *Plectoceras* is said to be Ordovician, Silurian and gyroceraconic, and *Sphyradoceras* Silurian, Devonian and "almost exclusively torticonic of the trochoceran type."

If *Trochoceras Halli* is a *Plectoceras*, there are at least two Canadian species of that genus, whose synonymy is as follows:

PLECTOCERAS JASON (Billings).

Nautilus Jason, Billings. 1859. Canad Nat. and Geol., vol. iv, p. 464.

Plectoceras Jason, Hyatt. 1883. Proc. Boston Soc. Nat. Hist., vol. xxii, p. 268; and (1894) Proc. Amer. Philos. Soc., vol. xxxii, p. 498.

Types: three specimens in the Museum of the Geological Survey of Canada, that were collected by Sir W. E. Logan and James Richardson in 1856, from the "Chazy limestone" (not the Calciferous, as stated by Hyatt) of the Mingan Islands.

PLECTOCERAS HALLI (Foord).

Lituites undatus, Hall, pars. 1847. Palæont. N. York, vol. i, pl. XIII, figs. 1*a* and 1*b* (cæt. excl.).

Trochoceras Halli, Foord. 1861. Cat. Foss. Cephal. Brit. Mus., pt. ii, p. 41, and p. 42, figs. 4 *a*, *b*.

Types: two specimens in the British Museum, from the Black River limestone at Lorette. Similar specimens in the Museum of the Survey are from Lorette and other localities in the Province of Quebec, as previously stated, and Mr. Walter R. Billings has found a specimen that seems to be referable to this species in rocks of the same age near Ottawa city.

The brief description of *P. obscurum*, Hyatt, unaccompanied

as it is with any illustration, is insufficient to show whether it is synonymous with *P. Foordi* or distinct therefrom.

In the Black River limestone of Ontario and Quebec there are two other species of cephalopoda that may belong to the genus *Plectoceras*, though the few specimens that have yet been found of each do not give any indications of the shape or position of the sipuncle.

One of these is a large specimen from Kingston, Ont., and its immediate vicinity, of which the writer has seen three specimens. Two of these are still in the Museum of Queen's University, and the other has recently been acquired, by exchange, from the authorities of that institution, for the Museum of the Geological Survey. All three, upon the whole, agree very well with Emmons' two figures of *Inachus undatus*, and with Hall's representations of *Lituites undatus* on Plate XIII, fig. 1, and Plate XIII *bis* of the first volume of the Palæontology of New York. But the writer has not seen any Canadian fossil that exactly corresponds with the original of Plate XIII, fig. 3, of that publication, in which the siphuncle is represented as placed at a short distance from the venter, as in *P. Jason*. The two specimens in the Museum at Queen's show only traces of the surface markings, and the sutural line of one of them is curved concavely and shallowly backward on the side preserved, and not parallel to the obscure plicæ. The specimen now in the Ottawa Museum is a cast of the interior of the septate portion of the shell, five inches and a half in its maximum diameter, with fragments of the test attached. Its outer volution is subquadrate in transverse section, and the surtural lines are nearly straight on the sides but shallowly concave on the venter or periphery. It is doubtful whether these specimens should be called *Eurystomites undatus* (Emmons) as suggested by Hyatt, or *Plectoceras undatum* (Emmons).

The other is the *Gyroceras* (*Lituites*) *vagrans* of Billings (1857) from La Petite Chaudière Rapids, near Ottawa city, and near Mile End, Montreal. Of this species the writer has only seen two specimens, both from La Petite Chaudière. The more perfect of these is the type of the species, a very imperfect and badly pre-

served specimen, in the Museum of the Geological Survey. As Mr. Billings says of this specimen, it exhibits only "an artificial polished section passing through the central plane of the whorls, shewing clearly the construction of the tube to the apex, where it has a diameter of only one line ; some of the septa and almost one-half of the transverse section ; but neither the siphuncle, the character of the surface, nor the length of the produced oral extremity is indicated."

The attention of collectors in Kingston and Ottawa is called to these two very imperfectly defined species, in the hope that a renewed and diligent search at these localities would result in the discovery of specimens that are sufficiently perfect to establish their position among modern genera, and to more fully elucidate their specific characters.

Ottawa, Sept. 21st, 1903.

A ROBIN STORY.

EMERY PERRIN, Ottawa.

One early morning in the first week of June last, as I was standing at my bed-room window, facing the garden, I perceived a male robin which was literary dancing on top of the fence, while chirping loud without interruption.

On opening the window, I knew by the bird's antics and shrill voice that something was wrong, possibly with it's mate, and that the brave fellow was actually *calling for help.*

I hastened down to the garden, and the moment the robin saw me it redoubled it's efforts to attract my attention, flying to and fro and from me to the fence, as if to indicate that the trouble was on the other side of it. At which I concluded that some prowling cat must be in the very act of devouring the robin's mate or one of it's young.

But no, there was no devouring being done yet. Only a big tom-cat was crouching on a pile of old lumber and watching from that point of vantage a poor female robin that was hanging by a piece of twine fastened to its broken leg from a heavy lopped-off plum-tree branch lying on the ground between pile and fence. The

cat appeared to be puzzled, on the one hand, by the whirling of the captive bird, and somewhat intimidated, on the other hand, by the frantic appeals and plucky showing of the male robin.

All this I saw in the twinkling of an eye

Jumping over the fence, I took hold of the captive bird with my right hand and of the rather cumbersome branch with the left, and tried to cut the twine with my teeth, as I had no knife with me at the time ; but in this I was unsuccessful. So, retracing my steps over the fence with bird, branch and all, I reached my shed, where I knew there was a pair of scissors, with which, on second thought, I severed, not the twine, but the mere shred of skin that still held together the dislocated leg of the bird, and so released the latter.

After a few gentle strokes of the hand upon its back, I let the now crippled robin take its flight. It alighted first on the ground in the garden, and remained there for a few minutes, regaining it's wind and strength. Then it perched itself on one of the plum-trees

After relating the above facts to my people at the breakfast table, my sister and I repaired to the garden, where to our utter amazement and delight we beheld the crippled robin bathing it's stump in a pail (which I had previously filled with water) by *sitting* on the brim of the pail and lowering itself so as to reach the refreshing liquid. And that it did repeatedly in our presence, when we were but a few feet away from it

Finally my sister wanted to capture the poor thing, so as to nurse it's amputated limb, and she made a move in that direction, but the wounded robin flew away with it's male companion who had been around all the time, giving vent to it's fear by repeated notes of anguish, and it was not seen any more.

THE ENTOMOLOGICAL SOCIETY OF ONTARIO.

The Fortieth Annual Meeting of the Entomological Society of Ontario was held in Ottawa, on Thursday, Friday and Saturday, the 3rd, 4th and 5th Sept., 1903. Among those present were Prof. W. Lochhead, Ontario Agricultural College, Guelph, President of the Society; J. D. Evans, Vice-President, Trenton; W. E. Saunders, London, Secretary; Dr. L. O. Howard, U. S. Entomologist, Washington, D.C.; Rev. Dr. Bethune, London; H. H. Lyman, A. F. Winn, C. Stevenson, G. A. Moore, and A. E. Norris, Montreal; J. B. Williams, Toronto; Dr. James Fletcher, Arthur Gibson, C. H. Young, W. H. Harrington, Dr. Blackadar, Dr. C. Guillet, T. J. McLaughlin, and other residents of Ottawa.

On Thursday morning a meeting of the Council was held, and during the afternoon, beginning at 2.30, the reports of the Council, District Directors, Delegate to the Royal Society, and of the Montreal, Toronto and Quebec Branches of the Society, were presented. The reports of the Directors dealt chiefly with outbreaks of injurious insects in the different Districts represented, while those from the Branches reviewed the work carried on during the year.

The first paper on the programme was one by Rev. Dr. Bethune, of London, Ont., "A menace to the Shade trees of London, Ont." This made mention of the presence, particularly on maple trees, of millions of the Cottony Maple Scale. These insects occurred in great numbers along the lower sides of the branches, resembling large woolly deposits on the trees, being very unsightly and at the same time injurious. Mr. H. H. Lyman, of Montreal, read a paper "Two Remarkable Aberrations (Lepidoptera)," in which he recorded the capture in Montreal of a most beautiful form of *Spilosoma virginica*, which was clearly and definitely banded with black, as in *Colias philodice*, and one of *Melitæa phaeton*, which lacked the white spots above. A paper "Additions to Quebec Syrphidæ," by Mr. Gus. Chagnon, was presented, and gave interesting new records of the collection in that province of flies belonging to this family.

On Thursday evening in the Assembly Hall of the Normal School, the President, Prof. W. Lochhead, delivered his inaugural address, "The Progress of Entomology in Ontario." This was a practical address, very suitable to the occasion, and contained

much useful information as to the important part which had been played by the Entomological Society in developing economic entomology in Canada. He divided the history of the Society into three periods, referring to the excellent work which had been performed during these periods by some of the prominent workers whose names were now so well known in connection with the Society.

Following Prof. Lochhead's address, Dr. L. O. Howard, U. S. Entomologist, gave a succinct statement as to the Transmission of Malaria and Yellow Fever by Mosquitoes. This presentation of a subject which is now acknowledged to be one of the greatest discoveries of the latter end of the last century, was treated in such a plain and delightful manner by the eminent lecturer, that it is no exaggeration to say that the whole audience sat spellbound during the half hour, which seemed to be only a few minutes, so keen was the attention. After these two speeches another half hour was taken up with answering the many questions bearing on the latter subject, which were asked by many of those present. It is greatly to be regretted that so few of the medical profession were in attendance. Knowing the intense interest of this subject to them and its bearing on the well being of the country at large, every doctor in Ottawa had been specially and individually asked to be present.

On Friday morning the Society met early, and many valuable papers were read and discussed. Dr. Howard spoke of "Recent Work in American Economic Entomology," and gave an account of the excellent work on the Cotton Boll Weevil which had been performed by the officers of his department, and pointed out the large saving in actual money which could be made in similar cases by the application of definite scientific knowledge

"Insects Injurious to Crops in Ontario in 1903" were dealt with, together with the remedies which had been found most effective in saving loss, by Prof. Lochhead, of Guelph, and Dr. James Fletcher, of Ottawa. Prof. Lochhead also read a paper on "The Present Status of the San José Scale Question in Ontario," and showed plainly how serious a matter the presence of this insect in the Ontario orchard of the Niagara and St. Catharines Districts really was. Insects Injurious to the Basswood tree, were treated by Mr. Arthur Gibson, of Ottawa.

On Friday afternoon further papers were presented. Dr. Fletcher read a draft of the Entomological Record for 1903, pointing out the advantage to working entomologists of this record and urging that the different families of insects should be treated of by specialists. Dr. Fletcher also read "Notes on the Life histories of two rare Manitoban Moths, *Apocheima rachelæ* and *Leucobrephos middendorfi*," the eggs of both of which had been received from Mr. Norman Criddle, of Aweme, Man Rev. Dr. Bethune read a note on the occurrence of the beautiful Leopard Moth, *Ecpantheria scribonia*, at London, Ont., a larva of this species having been found by him and sent to Ottawa, where the moth was reared. Mr. Arthur Gibson read "Further Notes on the Larvæe of Canadian Tiger Moths, of the Genus *Apantesis*." Three cases showing the moths and inflated larvæ in various stages, were exhibited in illustration of this paper and were very much admired by all present at the meeting. "Notes of the Season in Western Quebec," were given by Mr. Charles Stevenson, of Montreal.

Specimens of remarkable and rare insects were exhibited during the meeting by the members present. An interesting feature of the meetings was the discussion of each paper as it was delivered. Every meeting was open to the public, and it is surprising that so few members of our Club availed themselves of the opportunity of learning something about beneficial and injurious insects. Through the kindness of the Ottawa Board of Trade, the day meetings were held in their commodious and very comfortable room on Elgin street.

On Saturday morning a visit was made to the Division of Entomology at the Central Experimental Farm, where a very pleasant hour or two was spent in examining the collections under the guidance of the Entomologist and his assistants. At 12 o'clock the visitors were driven all around the Farm, and at 1 o'clock were entertained by Miss Dorothy Fletcher, to an *al fresco* lunch in the Botanic Garden. The afternoon was spent by such members as could remain, in an excursion to Dow's Swamp and the Rideau River. Dr. Fletcher who accompanied the party pointed out localities of special interest, and although, owing to the weather, few specimens were secured, everyone was well satisfied with the outing.

FIRST AUTUMN SUB-EXCURSION.

A most successful sub-excursion—the first held this autumn—took place on Saturday afternoon, September 26th. About 50 members and friends of the Club, including many of the Normal School students, left the pavilion at Rockcliffe under the guidance of the President, Mr. W. T. Macoun, and spent a most delightful afternoon in the woods around Rockliffe, Mackay's Lake and Beechwood. The weather was perfect for such an expedition. The beauty of the autumn woods called forth many appreciative exclamations of wonder, and one pair of hands could hardly hold the many treasures gathered by every member of the party. The company very soon broke up into three groups, one going with Dr Ami to study the fossils near the river. The main body followed the President along the eastern shore of Mackay's Lake. where they studied the trees and shrubs, of which there is there great variety. A smaller party went with Mr. Attwood, Dr. Whiteaves and Dr. Fletcher around the western shore. Afterwards both parties joined in the woods near Beechwood. Here short addresses were delivered by the President and Dr. Fletcher. Special attention was directed to forest trees, berries and other fruits. The distribution of plants was illustrated by the various kinds of burs, of which a large and representative collection was available on the clothes of the excursionists. Some rare ferns were collected and exhibited such as *Pellæa gracilis*, the Rock Brake, *Asplenium angustifolium*, and *Aspidium Goldianum*. Simple characters were given by which the different families of ferns could be recognized. The greatest rarity found was the curious Peloria state of the Common Toad-flax, *Linaria vulgaris*. Violets, which have been so carefully studied in this locality, also came in for some attention, and the inconspicuous cleistogamous flowers and autumn fruits of several species were shown, including *Viola Dicksonii* with its underground fruit, and pods which had been formed underground and had then pushed their way to the surface two or three inches from the main stem. The automatic distribution of the seeds of violets by the contraction of the strong valves of the pods was explained. The autumn flowers of the Canada Violet were much admired. The hibernation of insects came in for some attention, the caterpillar of the Isabella Moth serving as an illustration. The gay caterpillar of *Cucullia asteroides* was found on *Aster cordifolius*.

BOOK NOTICE

BOTANY—THE ARTIFICIAL CULTIVATION OF TRUFFLES.

Boulanger, M. Emile. Germination de l'Ascospore de la Truffe: 4to, pp. 20, 20 plates, Paris, France, 1903.

Until quite recently, as may be seen in books of botany, the early stages of the Truffles were unknown. This, however, owing to the skill and careful work of the author of the above pamphlet, is no longer the case. Mr. Boulanger has recently given us the results of his patient scientific studies on the germination of the spores of two species of edible truffles, and there is no doubt that, before long, developments of great economic importance in the cultivation of these fungi may be the outcome of his studies. One of the species used by Mr. Boulanger in his investigations is the Black-spored Truffle (*Tuber melanosporum*), which is the truffle most highly valued by epicures; the other the Hook-bearing Truffle (*T. uncinatum*), although also edible, is less esteemed.

The author in 1898 first obtained the germination of the spores in sterilized water, and from these, on slices of cooked carrots sunk in the earth, he grew the mycelium or spawn. This was afterwards produced on the earth itself and on other media; then, finally, from the mycelium he succeeded in growing fully developed truffles in his laboratory. These, it is true, lacked the characteristic taste and smell which give truffles their gastronomic value; and, moreover, they were misshapen; but, nevertheless, they were true adult perithecia of *Tuber uncinatum* containing normal asci.

The next step was to try the practical cultivation of the fungi in the open air under the conditions in which truffles grow in nature. This was done in 1900 on seven acres of an old oak forest at Etampes, near Paris; pieces of raw carrot impregnated with the spawn were buried at the base of oak trees and a special fertilizer (6 per cent. potassium sulphate and 6 per cent. superphosphate of lime) applied on the surface of the soil. On the 7th May, 1903, specimens of truffles of the second crop from these cultures were exhibited by Mr. Boulanger at the meeting of the Mycological Society of France. These specimens grown under natural conditions out of doors, it may be remarked, had the fully developed aroma and taste of commercial truffles, although, as stated above, those grown in the laboratory from similar stock did not develope those important characteristics.

Two fine plates accompany the pamphlet and show the spores in the different stages of germination. This work is an important contribution both to science and horticulture. J. A. G.

NATURE STUDY—No. VI.

NATURE-STUDY WITH ADVANCED CLASSES—AN EXPERIMENT.

Prof. W. LOCHHEAD, Guelph, Ont.

Bailey has said : "When the teacher thinks chiefly of his subject, he teaches a science ; when he thinks chiefly of his pupil, he is probably teaching Nature Study." This sentence puts in a nut-shell the proper *attitude* of the teacher of Nature-Study, but it should also be the attitude of every teacher who claims to *educate*, no matter whether he is dealing with pupils in the public schools, or with students in the colleges and universities. It must be admitted that the framers of the courses, and the teachers as well, in most of our colleges, lay too great stress on the subject-matter, and leave out, to a large degree, the student Of all colleges, an agricultural college should be the best school for the study of Nature,—and for Nature-Study as well, if there is a real distinction ; for from the outset the attention of the student is directed towards the soil, the plant, and the animal; yet, it must be confessed that the method of instruction in some of these colleges is still 'largely a reflection of mediæval practices and ideals."

For some time past the writer felt that the studies of the regular session dealt too much with laboratory collections and with books, and too little with out-of-door subjects. He felt also that the student should acquire the "habit of observing and seeing for himself and at his best, without books or help, in the presence of the facts and in the open air." It is true that the in-door method of investigation is an adaptation to meet unfavorable conditions. The regular session of the Ontario Agricultural College does not begin until the middle of September ; winter sets in about the first week of November ; and the session closes on the 15th of April. There is therefore little opportunity for thorough out-of-door studies during the regular session.

To remedy this state of affairs, a two months' course in Nature-Study was given at the College, for the first time this year to the students of the Third Year. This course began on the 20th of April, and continued until the 15th of June.

As the students were already familiar with the elementary facts of botany, physics, entomology, and zoology, the method of in-

struction was of course different from that usually adopted in our Public and Normal schools. The instructors gave no set of lectures ; they acted as guides, and suggestors of lines of investigation. The topics assigned to each student for investigation related as far as possible to matters of economic importance to the agriculturist ; for it was believed that such investigations would carry out the dual purpose of Nature-Study, which is : first, to " develope an attitude—a power of interpretation and appreciation of nature, a power of self-expression which will enable the student to gain a better control of himself and his surroundings, to live a fuller life, and to be of greater service to society than he otherwise would be " ; and, second, to gain that intimate knowledge of nature which will make men better able to cope with their living environment, or, in other words, for its economic usefulness.

From the very outset, the subjects assigned to each student could be studied best at that particular season ; for the writer believed strongly that Nature-Study should be taken up from a seasonal standpoint. Every student had to show the results of his studies in careful drawings and well-kept notes. For the first two weeks all the students took the same work, but for the remainder of the term individual work was the rule. Classes were formed for the study of birds every morning, and besides, excursions were made to the museum. Excursions took place also for the study of the structure and habits of the forest trees, the spring plants, the life of ponds and streams, and the common insects of the orchard ; as well as the study of the different soils of the Farm, and the rocks of the neighborhood.

Particular attention was given to the study of the winter buds and twigs of our common shrubs and trees. Keys were made for the determination of the common shrubs and trees on the College campus by means of their winter buds.

Following were some of the topics assigned : Recognition of trees and shrubs by the winter twigs and buds ; the story of an apple twig ; a study of the fruit-spurs of our common orchard trees and shrubs ; a study of trees, from a distance and at close range ; a study of germinating seeds ; a study of the wood of dicotyledonous trees ; a study of the wood of coniferous trees ; recognition of grasses by their leaves ; studies of the sundew ; studies of the

rosaceous family ; the development of the apple and cherry; studies of the heavens at night ; the story of the dandelion ; the development of the frog ; the life-history of mosquitoes ; studies of snails and slugs ; the habits of the common birds (about 60 were identified during the term) ; studies of the currant-worm ; development of barberry and wheat rust ; lady-birds ; a soil survey of the Farm ; the grasses of Guelph ; insects and plants ; etc.

Throughout the whole course every student was compelled to record daily in the "Nature-Study Journal" some observation which he had made during the day. This Journal was carefully inspected every day by an instructor, in order to determine the accuracy of the descriptions of the observations made by the students. As the term wore on, the observations were given in greater detail.

For the first two weeks of the term the class met for an hour every day at two o'clock. At first the time was devoted mainly to explaining the written instructions given out to the students, and to encouraging the observers. Later, however, two of the students were selected every day to report the results of any investigation which they had concluded. The object of this was to give them facility in expressing their ideas before an audience.

It is likely that some of the students who took this Nature-Study course at the Agricultural College will sooner or later become teachers of Agriculture, and perhaps Nature-Study, in either the Public or High schools of this province In the writer's judgement, the knowledge of plants, animals, earth, and sky is absolutely necessary to the teacher who essays to teach Nature-Study. It appears to be of greater importance than the knowledge of the psychology of the child. It is probable that the teacher, who is himself a nature student, has gained through his own experience an insight into the best way of interesting the child, such as he could never obtain in any other way. A teacher may have a knowledge of child-nature, but if he has not a knowledge of nature as a part of his environment, it will be next to impossible for him to maintain for any length of time, in a direction which will be educative, the child's natural interest in its surroundings. How can a teacher train the child to use the materials of knowledge, such as plants and animals, in the proper development of the

phases of its being, if that teacher himself cannot use the materials of its knowledge?

That this Nature-Study course was a success, was the verdict of the whole class. Although it ran into the holidays of the student, who usually places a high value on his holidays, yet every member of the class considered that the time had been well spent, and that they had got a glimpse into nature that will ever remain as a refreshing picture. Most of the students were the product of our Public and High school system, and had to a certain extent lost their independence. They had been spoon-fed too much, and were practically unable to investigate and verify facts for themselves. This Nature-Study course delivered them from this bondage; it made them investigators and have opinions of their own. To the writer the work seems of great value, not only for the information the students obtained at first hand, but for the attitude which it developed and the point of view obtained. The writer was not teaching botany, entomology, and geology; he was teaching plants, insects and fields.

The Nature-Study course will be given again next spring; and, if it proves satisfactory, will become a permanent feature of the Third Year.

As advocates of Nature-Study we all have one common object in view. Human as we are, our methods will be as varied as our minds, and methods are not the be-all and the end-all of education. With some of us, our methods may lead some authorities to believe that we are furnishing information chiefly; with others, methods may be over-done, too much attention being given to the cultivation of the Nature-Study *attitude*, and too little to the useful side. There is a happy medium, but only the very best teachers can hope to attain to that stage of perfection. It is clear, nevertheless, that, whatever mistakes may be made at the outset as to methods in the introduction of Nature-Study, "the essence of it," in the words of Bailey, "can never pass away, because it is fundamental to the best living."

THE OTTAWA NATURALIST.

VOL. XVII. OTTAWA, NOVEMBER, 1903. No. 8

THE LOWER JAW OF DRYPTOSAURUS INCRASSATUS (COPE).*

LAWRENCE M. LAMBE, F.G.S., F.R.S.C., of the Geological Survey of Canada.

(With three plates.)

The following remarks on the lower jaw of *Dryptosaurus incrassatus* are the partial result of the examination of the remains of two skulls of that species in the collection of the Geological Survey of Canada, and are offered in advance of a more detailed description of the specimens in course of preparation by the writer at the present time.

The two skulls are from the Edmonton series** of the Cretaceous system of the North-West Territory, and were collected by Mr. J. B. Tyrrell and Mr. T. C. Weston in 1884 and 1889 respectively. The first specimen, figure 1, was obtained two miles from the mouth of Knee Hills creek, a tributary of Red Deer river, in the District of Alberta. The second, figure 2, was found on the east bank of Red Deer river, about twenty-one miles above the mouth of Knee Hills creek.

A preliminary description of these specimens by Professor E. D. Cope appeared, in 1892, in the Proceedings of the American Philosophical Society.***

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* Communicated by permission of the Acting Director of the Geological Survey of Canada.

** Regarded by Tyrrell as comprising the uppermost beds of the Cretaceous system in Alberta. Geological and Natural History Survey of Canada, Annual Report, new series, vol. II, part E, 1886.

*** "On the skull of the Dinosaurian Lælaps incrassatus, Cope." Proc Amer. Philos. Soc., vol. XXX, p. 240.

The skull discovered in 1884, figure 1, is somewhat larger than the one found in 1889, figure 2. In both, the right ramus of the mandible is displaced downward so as to reveal its inner surface. In the 1884 specimen both halves of the mandible are preserved almost in their entirety. The left ramus lies against the lower left half of the cranium so as to conceal its inner surface in the vicinity of the anterior half of the surangular, and the corresponding part of the right ramus is hidden by some of the bones of the palate. In both rami, unfortunately, a considerable part of the lower border is missing below the front part of the surangular. The 1889 specimen consists of the anterior parts of the skull, the lower jaw lying against the palate so that the inner surface of the left ramus and the outer side of the right one is hidden. The left ramus is preserved for about three-fourths of its entire length from the front but the right ramus is broken off at about its mid-length.

In comparing the mandible of *Dryptosaurus incrassatus* with that of the Jurassic *Ceratosaurus nasicornis* of Marsh, it is seen, that the former is deeper, in proportion to its length, than the latter, otherwise the general contour in both species is somewhat similar.

In the Canadian specimens the following elements of the lower jaw are more or less clearly exhibited :—the dentary, the surangular, the angular, the articular and the splenial, with a presplenial. The coronoid is in both specimens either not preserved or is covered by other bones of the skull.

The dentary is a large and robust bone extending backward to beneath the articular cotylus. Its greatest depth is attained at about its mid-length, where it meets the surangular and narrowing rapidly passes backward below that element, overlapping it posteriorly as a thin plate terminating in an acute point, figure 3. On the inner surface the dentary occupies about one-half of the lower depth of the jaw anteriorly, narrowing backward gradually until it passes to the outer surface. In the amount of its backward extension it equals that of the dentary of *Sphenodon* as described by Günther in the Philosophical Transactions of the Royal Society of London in 1868.*

* "Contribution to the Anatomy of Hatteria (Rhynchocephalus, Owen)." Philos. Trans. Royal Soc., vol. 157, p. 595, pl. xxvi, fig. 7.

The surangular is broadly arched above, as seen in side view, and almost completes the remainder of the outer surface of the mandible, the posterior end of the angular being visible inferiorly to a limited extent. The surangular is strengthened exteriorly, near its upper border, by a prominent rounded ridge extending for some distance forward from the articular cotylus into the composition of which this bone enters. It embraces the articular anteriorly and passing beneath it extends as far back as the posterior limit of that element. It is pierced by a large foraminal opening at about one-fourth its length in advance of its back termination and at about its mid-depth ; its inner surface in this region is deeply concave (figure 4). Below the foramen the bone becomes gradually thinner, where it is overlapped by the dentary, and is continued forward with a thickness inferiorly of only a few millimetres, although posteriorly and along its upper border it is a strong and robust bone.

The articular is small and compact, roughly triangular in shape, and is scarcely seen except when viewed from above. It forms about two-thirds of the cotylus and is overlapped on its inner side by the angular, which extends nearly as far back as either the surangular or the articular. Its breadth exceeds its antero-posterior diameter.

The cotylus is transverse, strongly bifossate and evidently points to a strictly upward and downward motion of the jaw, as the distal end of the quadrate fits closely into it. The movement of the jaw is, therefore, apparently restricted, and differs from that of *Sphenodon* in which the articulating surface is nearly four times as great antero-posteriorly as the condyle of the quadrate and admitted of a backward motion of the mandible.

The slender bone meeting the surangular below the articular, and embracing the latter element on its inner surface, is regarded as the angular. It passes forward on the inner surface of the ramus in contact with the inferior edge of the posterior extension of the dentary but is, unfortunately, broken in both rami of the 1884 specimen at a point slightly behind the mid-length of the surangular. The break in both halves of the jaw at this point is unfortunate as it is here that the junction of the angular with the splenial would have been looked for. It is probable, however, that

anteriorly the angular increases considerably in depth reaching the coronoid above and the splenial in front.

The broad lamellar bone immediately above the dentary on the inner surface of the ramus (figure 2) is the splenial. It is misplaced in the specimen figured in plate I, and it is seen in section in its proper position in both skulls at the points *e* and *f* in figures 1 and 2 respectively. It is perforated near its anterior end and close to its lower border by a large oval foramen. At a short distance behind this foramen a well marked emargination of the bone occurs, visible in both specimens but shewing more decidedly and to a greater extent in the skull figured in plate I. The outline of this emargination bears a strong resemblance to the anterior end of a second foraminal opening, which if it did exist, may have been partly formed by the angular as in *Crocodilus*.

Continuing forward from the splenial is a narrow presplenial that apparently reaches to, or almost to, the front limit of the dentary.

Above the presplenial the inner alveolar plate of the dentary, of about the same depth as the presplenial, forms the inner wall of the dental chamber and completes the inner anterior surface of the ramus. It meets the splenial posteriorly and narrows rapidly upward, but its relation to the dentary and the splenial, behind the dental series, has not been ascertained. Its upper border is at a lower level than the outer alveolar border of the dentary.

In *Megalosaurus* the bony partitions dividing the alveoli from each other are described* as springing from the inner alveolar wall and projecting outward to the inner surface of the outer wall. The reverse of this seems to be the case in *Dryptosaurus*, in which the principal alveolar grooves are apparently formed on the inner surface of the outer dentary wall with little or no development of grooves in the alveolar plate. In this particular the alveoli of *Dryptosaurus* are somewhat similar in general plan of structure to those of the dental chamber of the mandible of the Cretaceous

* "Notice on the Megalosaurus or great Fossil Lizard of Stonesfield," by the Rev. William Buckland. Trans. Geol. Soc., London, second series, vol. 1, p. 395, pls. XL and XLI, 1824; and "On the Skull of Megalosaurus," by Professor Owen. Quart. Jour. Geol. Soc., London, vol. XXXIX, p. 339, pl. XI, 1883.

species of *Trachodon** (and possibly also of the genera *Monoclonius* and *Triceratops* and their allies), in which the teeth move upward in well defined grooves in the inner surface of the outer wall of the dental chamber, whilst the surface of the inner wall of the chamber is comparatively even and smooth. The partitions between the alveoli in *Dryptosaurus* seem to form part of, and to be continuations or extensions of, the inner surface of the outer dentary wall inward toward the dentary plate with which they are apparently not connected. In the left ramus of the specimen shewn in figure 1, the crowns of all the teeth except the twelfth are broken off close to the alveolar border leaving sections of their bases exposed at this level, so that the exact position of the teeth is definitely determined. In the right ramus of the same specimen, however, seven of the teeth (seen only in the right aspect of the specimen) are preserved intact. In the specimen figured in plate II fourteen teeth of the left ramus are preserved, whilst in advance of the anterior full-sized tooth a small tooth partially protudes at a lower level. This tooth is apparently an additional one in the series and not a successional tooth, making the total number, in the complete dental series, fifteen. It is truncated posteriorly so as to be similar in shape to some of the teeth described by Leidy, under the name *Deinodon horridus*,** as being peculiar in form, and to a tooth referred to by the writer in his description of *Ornithomimus altus**** as being from the anterior portion of the jaw. No successional teeth have been observed in either of the specimens of *Dryptosaurus* from the Edmonton series. The teeth of this species (without reference to such as may be considered to be incisors) are carinated on their anterior and posterior edges, the carinations being minutely serrated, with about ten to twelve denticulations in a space of 5 mm. They are lenticular in section above (figure 7), but in passing downward a

* Contributions to Canadian Palæontology, vol. III (Quarto), part II, "On Vertebrata of the Mid-Cretaceous of the North West Territory," by Henry Fairfield Osborn and Lawrence M. Lambe, pp. 73 and 78. 1902.

** Trans. Amer. Philos. Soc. Extinct Vertebrata from the Judith River and Great Lignite Formations of Nebraska, by Joseph Leidy. 1860, p. 144, plate 9, figs. 37-40.

*** Contributions to Canadian Palæontology. 1902, pp. 53, pl. XIV.

flattening of the anterior and posterior borders takes place and becomes more pronounced near the base of the crown, a slight flattening of the sides of the teeth also becoming more decided in the lower portion of the crown. The anterior carina passes gradually to the inner side of the crown whilst the posterior one is well over toward the outer side for the greater part of its length. The posterior keel extends downward for the whole length of the crown but the anterior one stops at about one-fourth the height of the crown from its base.

The anterior part of the external surface of the dentary of the smaller specimen is rough, and exhibits a number of small foramina, near its lower front margin, with others in a line at some distance below and parallel to the alveolar border. In the larger specimen a few openings of corresponding size are also apparent near the anterior lower border of the dentary but the general surface of the bone is smoother. In this specimen also a somewhat obscure row of shallow depressions extends upward and backward in an oblique curve (above *e* in figure 1) across the dentary at about its mid-length. This feature is suggested in the dentary of the smaller specimen, but it is too indistinct to be spoken of with certainty. The front portion of the surangular is striated as shewn in figure 1.

MEASUREMENTS.

Of larger specimen, collected in 1884 (plate I).

	MM.
Extreme length of left ramus of mandible	970
Greatest depth of same (approx.)	227
Length of dentary	905
Depth of dentary at its mid-length, at *a*, figure 1 (approx.)	185
Thickness of ramus at mid-height anteriorly, at *b*, figure 1A	52
Length of surangular above	490
Thickness of surangular through the ridge near its upper border, at *c*, figure 1	33
Thickness of surangular above the ridge, at *c*	23
,, ,, below ,, ,,	14
Height of surangular foramen	38
Width of posterior portion of angular near its distal end, figure 4	50
Width of same at *g*, figure 4	30
Thickness of same at *g*	23
Transverse diameter of articular cotylus	112
Thickness of ramus from upper surface of cotylus, at its mid-length, to lower surface of dentary	42

Combined thickness of dentary and surangular at *h*, figure 3	10
Length of crown of fifth tooth of right ramus	54
Breadth of base of crown of same	28
Thickness of ,, ,,	18

Of smaller specimen, collected in 1889 (plate II).

Length of dentary, above, to its junction with the surangular	380
Depth of dentary at its junction with the surangular	160
Length of angular foramen	50
Length of crown of sixth tooth	38
Breadth of crown of same at base	18
Length of crown of seventh tooth	55
Breadth of crown of same at base	21
Length of crown of eighth tooth	46
Breadth of crown of same at base	21
Length of splenial foramen	52

EXPLANATION OF PLATES OF FIGURES ILLUSTRATING THE MANDIBLE OF *Dryptosaurus incrassatus* (COPE).

PLATE I.

Figure 1. Mandible of the larger of the two specimens, as seen from the left; two-fifteenths, or slightly more than one-eighth, the natural size.

Figure 1A. Section of left ramus of same, through the sixth tooth from the front; similarly reduced.

PLATE II.

Figure 2. Side view of mandible of specimen collected in 1889; one-sixth natural size.

Figure 3. Exterior aspect of posterior end of left ramus of mandible shewn in plate I; one-fourth natural size.

Figure 4. Interior view of same; similarly reduced.

PLATE III.

Figure 5. Exterior of left ramus.

Figure 6. Interior of the same.

Figure 7. Outlines of transverse sections of a tooth; the upper section is taken at about one-third the height of the crown below its apex; the middle section from a little below the mid-height of the crown; the lowest section from near the base of the crown; in the figures the upper side corresponds with the outer surface of the tooth and the portions on the right to the anterior border of the crown.

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d, dentary; *ang.*, angular; *art.*, articular; *sur.*, surangular; *sp.*, splenial; *psp.*, presplenial; *cor.*, coronoid.

SECOND AUTUMN SUB-EXCURSION.

The second autumn sub-excursion of the Club was made to Blueberry Point, near Aylmer, Que., on Saturday, Oct. 3. Between thirty and forty persons attended. Leaving the city by electric car at 2.20 p.m., the Point was reached shortly before three o'clock. The whole party went at once to the lake shore and there divided, part remaining near the water in order to examine the rocks of the Chazy formation, and to collect shells, many kinds of which were found in a small stream. The other part of the company resorted to the woods to study the trees and herbaceous plants and to search for insects. It was a delightful autumn afternoon, and the woods presented a beautiful appearance. The autumn tints of the maples, sumachs, white ashes, and oaks, were at their very best, and presented a gorgeous spectacle. The Red Maple is the commonest species at Blueberry Point, but the Silver Maple and the Sugar Maple also occur there abundantly. Fine large trees of the Silver Maple growing near the lake offered good subjects for comparison with the Red Maple. Nearly all the different kinds of evergreens which occur near Ottawa, are to be found at this spot, and these also afforded good material for study. Blueberry Point is one of the few places in the Ottawa district where the Banksian or Northern Scrub Pine is found, and quite a number of these trees were seen within two hundred yards of the car track, growing with the White and Red Pines. Among the herbaceous plants of interest found during the afternoon, mention may be made of the Closed Gentian (*Gentiana Andrewsii*) with its large purple flowers, which was collected near the lake shore, together with the Hairy Germander (*Teucrium occidentale*, A. Gray), the Small Scull-cap (*Scutellaria parvula*, Mx.) with its curious seeds, the Yellow Water-Crowfoot (*Ranunculus delphinifolius*, Torr.) in flower and seed, and on the mud near a little stream the Water Starwort (*Callitriche palustris*, L.) was found. Up in the woods beneath the pines, *Viola subviscosa*, Greene, and *V. cardaminefolia*, Greene, rewarded a diligent search. At 4.45 p.m. the party re-assembled, and the specimens collected by the excursionists were examined by the Leaders and named for those who wished to have them identified. The President made a few remarks, congratulating those present on the success

of the outing, and invited anyone present who wished for information to ask questions, when they would be answered by the Leaders. In reply to a question, Dr. Fletcher pointed out the botanical differences between the Blue Beech (*Carpinus Caroliniana*, Walt.), and its near relative the Iron-wood or Hop Hornbeam (*Ostrya Virginiana* [Mill.] Willd.). He then referred to some of the specimens collected during the afternoon, and drew attention specially to the Trailing Arbutus, which was shown with its fully formed flower buds, even then ready to expand and give forth their delicious perfume with the first warm breath of next spring. He spoke also of some of the common reptiles, and gave interesting facts about their useful lives, illustrating his remarks at the same time by showing some fine living specimens of Pickering's Tree Toad and the Leopard Frog. While pointing out the beauties of a large specimen of the latter, and the value of his livery of gold, bronze, black, and green for protective purposes, the frog, apparently not relishing the notoriety he was getting, or in an excess of modest confusion when the eyes of about thirty young ladies were directed towards his points of beauty, sprang wildly forth from the demonstrator's hands in an effort to escape. He was, however, soon captured by one of the active young ladies and brought back again to be further studied. When finished with, he was given his liberty, and showed his appreciation by quickly disappearing into the grass. Before closing, Dr. Fletcher spoke of the advantages to be derived from such outings as we were then enjoying, and the special value of our club to all lovers of nature, claiming that it was not organized nor conducted for scientific students only, but provided an easy road with a wide-open door, inviting and encouraging all those who wanted to know more about nature and the common objects about them, to come in and learn more. They would thus become happier men and women, and more useful citizens.

A large proportion of the excursionists consisted of Normal School students, and among others who were present were the First Vice-President, the Secretary and the Treasurer of the Club, and Dr. J. F. Whiteaves, Leader in Conchology, who during the afternoon kindly pointed out many things of interest in the rocks,

and also showed what a large variety of fresh-water shells could be collected in a small area by those who knew how to look for them, and Miss Matthews and Miss McQuesten, both members of the Council.

W. T. M.

BOOK NOTICE.

THE ORTHOPTERA OF INDIANA.

By W. S. Blatchley, State Geologist, Indianapolis, Ind., from the 27th Annual Report of the Department of Geology and Natural Resources of Indiana, 1902. 8vo., pp. 348.

We are glad indeed to welcome this last work of Prof. Blatchley's which has just appeared. It is practically a popular manual of the Orthoptera of Indiana and the adjoining States, written in the plainest language, and with full explanations of all necessary technical terms. The author has been very happy in presenting his favorite subject, which he has studied for many years, in a succinct, intelligible manner, a fact which will doubtless render his book a useful manual for many students of this interesting order of insects in other parts of North America. The author has prepared his work for beginners and for others who have no particular knowledge of insects, and, as is not always the case, he begins at the beginning of his subject. In the first chapter, on the external anatomy of a locust, he points out the difference between insects and other animals, and then describes fully the different parts of a locust and their functions. A useful division of this chapter treats of the enemies of locusts, some kinds of which frequently do work of inestimable value in controlling outbreaks of certain species which occasionally become destructively abundant. A plea is made for the protection of some of the birds which do good service in this way, but are seldom recognized as friends, such as hawks, blackbirds, crows, bluejays, bluebirds and prairie chickens.

A bibliography gives the titles of the chief works or papers in which important information regarding the habits and life histories of locusts can be found. Those wishing for fuller information, are referred to Dr. Scudder's Index to North

American Orthoptera, which includes every known reference to each species up to the close of 1900. "A Descriptive Catalogue of the Orthoptera known to occur in Indiana" treats in a systematic manner of every species which has ever been found in the state. Excellent tables enable the student easily to refer a species, first to one of the two large sub-orders Saltatoria or non-Saltatoria, and then to one of the seven families included within these two sub-orders. The former, Saltatoria, embraces the *Acrididæ* or true locusts, the *Locustidæ*, or Long-horned Grass-hoppers and Katydids, and the *Gryllidæ* or Crickets. The non-Saltatoria includes the *Forficulidæ*, or Earwigs, the *Blattidæ*, or Cockroaches, the *Mantidæ* and the *Phasmidæ*, or Stick Insects.

There are no less than 148 species described in this little book in full detail, and among these we find a large proportion of our Canadian Orthoptera. Fourteen species of the number have been described by Prof. Blatchley himself, and six of these are new species described in this work for the first time. A short article treats of "the Life Zones of Indiana," as illustrated by the Orthoptera of the State, and the book concludes with a good glossary of terms and a full index. The illustrations are numerous and good. As a frontispiece, the beautiful coloured plate of the pink variety of *Amblycorphyra oblongifolia* on a head of *Solidago sempervirens* is used. This plate first appeared in "Entomological News" for May, 1901. J. F.

A WEED WORTH GROWING.

(Matricaria inodora, L.*)*

During the autumn of 1902 I had the good fortune to spend a few weeks on that gem of the sea, Prince Edward Island, and was particularly struck with the showy appearance of the above-named Mayweed, which grows as a way-side weed in Summerside and Charlottetown, as well as in many other parts of the Island away from the towns. Thinking, from the size of the flowers, that the plant might be worthy of a trial as a garden flower, I gathered some of the seed and sowed it last spring. On my return to Ottawa in the middle of August, I found a patch of plants 3 feet across and 2 feet high, covered with large flowers, several of them measuring over 2 inches across. From that time

till to-day (30th October), the flowers have been produced in profusion and have been much admired by all who have seen them among cut flowers. The foliage is like that of the ordinary Fetid May-weed (*Anthemis Cotula*), being 2-3-pinnately cut up into filiform lobes, of a rich dark green, but without unpleasant odour. This plant is called in England, whence probably it was introduced into Canada, Scentless Camomile or Corn Mayweed. It is an annual and its merits horticulturally are the profusion and continuous production of the showy flowers and the lateness in the season at which they may be found. Geraniums, Phloxes, and even the wild Mayweed, have all now been destroyed by frost, but this Scentless Camomile still holds its head up bravely.

J. FLETCHER.

SOME INTRODUCED PLANTS.

Linaria minor, Desf.—In Macoun's Catalogue, Part II, p. 353, there is a single record of this plant from St. John, N.B. During the past summer I have received specimens from Miss Ada Gardhouse, of Highfield, Ont., and also from Mr. F. J. A. Morris, of Trinity College School, Port Hope, Ont., who writes: "It grows profusely on the Grand Trunk Railway track, for a space of two or three miles east of Port Hope Station, and has been found by me for three years now. It blooms from the 1st of June in daily increasing quantities throughout the summer."

Teucrium Scorodonia, L.—Another introduced plant which has occurred in sufficient abundance to have attracted attention as a possible crop pest is the Germander Sage, which was sent in by Mr. G. Beaudoin, of Ste. Cécile de Whitton, Que., who had found one patch on his land.

SOIREES.—The programme for the winter meetings is now being prepared, and the chairman of the soiree committee (Mr. W. H. Harrington) will be pleased to receive from members of the Club the titles of any papers they may wish to present. When papers are to be illustrated by specimens it will be well to notify the committee of that fact, so that suitable arrangements may be made.

NATURE STUDY—No. VII.

IT IS THE SPIRIT WHICH GIVES IT EFFECT.

G. U. HAY, D. Sc., Editor "Educational Review," St. John, N.B.

So many children leave school at the age of ten or twelve, or even earlier, that it is important to have a well devised plan of nature-study for the elementary schools. Every healthy child is an observer of his surroundings. Before he enters school at all, he is familiar with a great number of material objects, and his questions show that he has thought about them. How important it is then to cultivate this attitude of the child toward his surroundings, lead him to acquire the habits of a naturalist, to find joys, as he grows older, in the country lanes and meadows —joys often denied to those who have superior mental equipment but who have not "eyes to see." Happy are the children who have parents and teachers intelligent, sympathetic and enthusiastic, who will enter with zest into the child's happy world, and will illustrate the lessons in reading and arithmetic, geography, history and drawing, by materials drawn from the child's own environment and resources.

In the charming story of "En Glad Gut" (A Happy Boy) by Björnson, the famous dramatist and novelist of Norway, Oyvind, the hero of the story, is shown at home in the world of nature around him. "His mother came out and sat down by his side. He wanted to hear stories of what was far away. So she told him how once everything could talk : the mountain talked to the stream, and the stream to the river, the river to the sea and the sea to the sky. But then he asked if the sky did not talk to anyone. And the sky talked to the clouds, the clouds to the trees, and the trees to the grass, the grass to the flies, the flies to the animals, the animals to the children, the children to the grown up people ; and so it went on until it had gone round ; and no one could tell where it had begun. Oyvind looked at the mountain, the trees, the sky, and had never really seen them before."

And "the mountain talked to the stream." Now what did the mountain say to the stream, any curious boy or girl will ask ? Did it not say : I have pushed my cool head into the misty clouds, and gathered around it the drops of moisture which give

you your joyous life—gurgling over with happiness. And the stream babbles its story to the river,—but let Tennyson's "Brook" or our own Geo. Frederick Scott's "Why Hurry, Little River" tell us that delightful story. And the river moves on with calm and easy motion and gives up—no, it only lends—its waters to the sea. And the sea says: Have I not enough and to spare? I will call up the bright god of day, and this very night when he comes down to bathe and refresh himself in my depths, we will think over a plan to pay back those givers who have poured their tribute without stint into my broad bosom; and the clouds alone shall be let into the secret. And the clouds, blushing all over with joy and pride at the importance of their secret, said: To-morrow morning we will put on our wings and call the winds to help us, and we will fill up the founts of those streams away off on the mountain side, and we will make fresher the green grass and the leaves of the forest. And the leaves in a flutter of delight will whisper the secret to the mossy ground beneath them. And the moss will hoard up the crystal drops in cool retreats of forest and ravine, and yield them slowly to thirsty streams in the parching drought of summer.

And so the stories might be multiplied, and the "fairy tales of science" with their generous substratum of scientific truth might nourish many a boy and girl and give a joy and perennial freshness to their whole lives. And this, I take it, is one of the great objects of nature-study—to develop a habit of mind which only comes by training—the habit of discerning the beautiful as well as the useful in the world, to distinguish the true from the false, to cultivate a reverence for the God that is behind nature and man.

"I hate botany! I hate the study of animals!" I have heard children say more than once. Perhaps we might find a reason if we step into certain school-rooms and see some of the antiquated methods that still prevail in teaching about plants and animals; to study the structure only and the names, and then fling the wilted remains of the plants into the waste-basket; or to make collection of twenty-five or fifty plants of the neighbourhood, mounted and labelled:—all very well if the study of botany does not begin and end here. The study of the life of the plant, its

habits, how it overcomes obstacles, how and where it thrives best, what it yields, how it takes substances from the earth and air, and converts them into food, these appeal more strongly to the active and enquiring child than making flowers into hay—dry work for a young naturalist. A mounted specimen of a bird, or a limp and lifeless body handed round in a class, may explain some details of structure. But is this all? The happy bounding flight, the joyous song, the services of birds to man, the sacredness of life, kindness to animals—are not these of more importance than structure and names? The lack of intelligent interest in plants and animals on the part of most young persons is due to the way in which the subject is presented to them in school.

Do teachers realize how fascinating it would be for their pupils to measure the distances along the roads which they walk over every day, to know the common wild flowers, trees, birds, and small animals by the wayside? To know the heights of the hills, the length of streams, the areas of fields and lakes near by. To have a portion of the school or home garden to tend and study the conditions of plant growth, along with bird and insect life? To be interested in the little animals that live in the fields and woods, and to have domestic animals to take care of daily? In these and a hundred other pursuits the enthusiastic teacher may lead the way, and stimulate and direct young people to make investigations. The children should be told as little as possible and be encouraged to find out as much as possible for themselves. It is wonderful how much may be accomplished by giving a boy or girl a start.

A friend of mine who is interested in the stars was staying at a house in the country for a week. She taught one of the boys of the family the positions of a few of the constellations, the planets in view, and some double stars; lent him a map of the heavens and a book on astronomy. The boy was an apt pupil, and the summer and winter skies have since been to him and many of his young friends the source of untold interest, opening a new world and sweetening hours of toil.

There is no need that country life should be monotonous. The fall of the leaves in autumn, the winter's sleep of plants under nature's protective garment, the ever-new awakening in

spring of bulb and seed and bud, the outburst of joyous song from our genial companions the birds, the insects, transformed and emerging from their concealment, are fresh miracles every season to the lover of God and nature. Every huge boulder rises like an interrogation point from the landscape, every rounded and polished stone carried down by the mountain rivulet, or resting on the shore of the restless ocean, is a page of history unrolled for him who will but read and think. Every forest tree, characteristic in shape, texture and foliage, springing from its tiny seed, has had a history of struggle and triumph over obstacles.

Need I say more? The excellent papers already given in THE OTTAWA NATURALIST have shown in the clearest and most intelligent way how teachers may make use of their opportunities. The thoughtful and earnest teacher, reading these, will be directed to the book of nature which, though it lies ever open, is perpetually sealed to him or her who has not "eyes to see." To the young or inexperienced teacher may I say: The children will be eager to meet you half way. Do not be ashamed to say: "I do not know;" but "let us put our wits together and find out" will be the magical password into nature's secrets and into the heart of the child. If you have any difficulty that you cannot overcome from your own knowledge and from books, you will find the writers of these papers just as willing to help you as they were to write for your benefit. That is the way they would like to pay the debt of gratitude which they owe to the unselfish naturalists who have helped them.

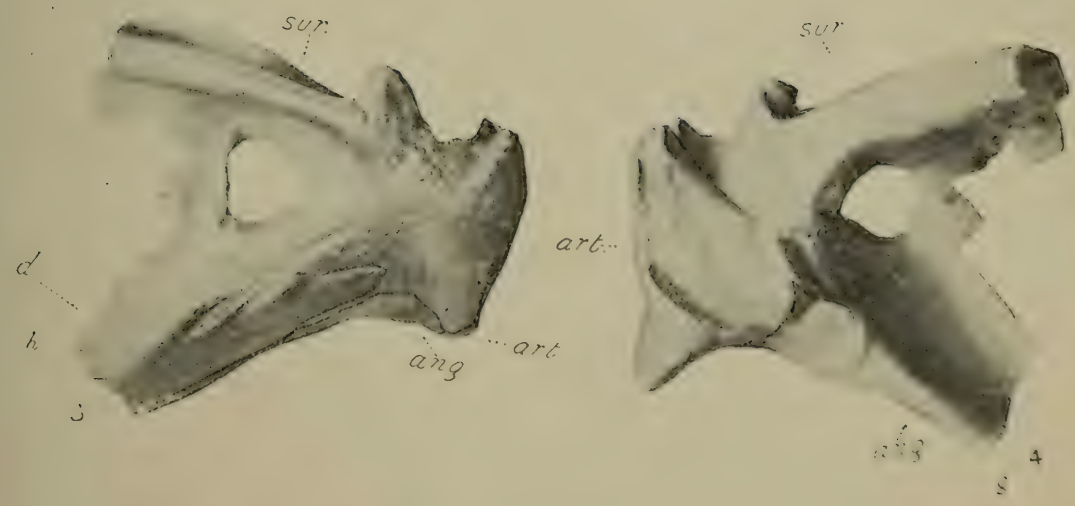
WHAT IS NATURE-STUDY?

Nature-Study is a method rather than a subject. It better expresses the spirit by which one becomes acquainted with the common things about him than its definite content or subject matter. It is not getting information about nature from books, or lectures, or conversations with others; but it is rather a certain attitude of mind towards all the phenomena of nature. The end being development rather than mere knowledge, the teacher of Nature-Study thinks of the effect of his work upon his pupils rather than of the content of the subject he is dealing with; he considers *how* his pupils know rather than *what* they know.

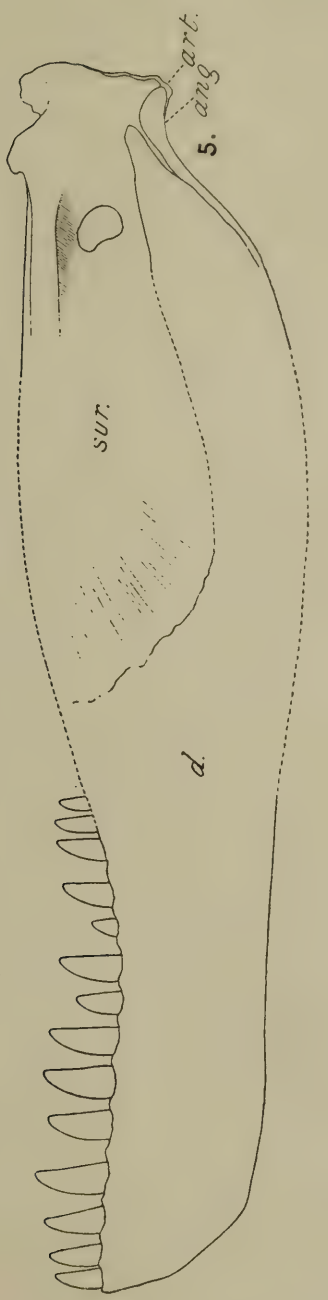
WM. SCOTT.

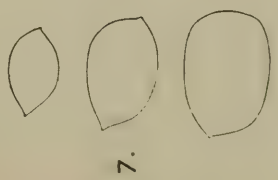
Normal School, Toronto.

Dryptosaurus incrassatus, (Cope).



Dryptosaurus incrassatus. (Cope)





Dryptosaurus incrassatus, (Cope)

THE OTTAWA NATURALIST.

VOL. XVII. OTTAWA, DECEMBER, 1903. No. 9

BIOLOGICAL NOTES ON CANADIAN SPECIES OF VIOLA.

By THEO. HOLM.

(With two plates, drawn from nature by the author.)

In recent years North American, and especially Canadian, violets have attracted considerable attention on account of their very liberal contributions to the number of "undescribed species"; but it so happens that we have gained no further knowledge of the life-history of the genus than we already possessed from the time when the *Violaceæ* were studied from a thoroughly scientific point of view, when species were studied and treated as living beings with some power to adapt themselves to their environment and to vary, instead of as mere unnamed herbarium material. It really seems as if the species of *Viola* fared better at the time of Linnæus than they do now, for at that time they were at least classified in such a way as to become readily determinable, while in recent years the accumulation of supposed new species has gone on so rapidly as to leave the enumeration of these in anything but a systematic arrangement, with the omission of important morphological characters and regardless of natural affinities.

We naturally arrive at the conclusion that it would be more desirable and more beneficial to the study of natural science if we contented ourselves with a smaller number of species but well-defined and better appreciable from a biological view-point. The mere leaf-outline, the presence or absence of pubescence, the relative size and color of the perfect flower are deceptive characters, and even the position of the so-called "apetalous" flowers: aerial or underground, is far from constant. Systematic works, even of a very recent date, seldom contain anything new in the line of biology or morphology, since the authors generally content them-

selves with reproducing diagnoses that have been published long ago, instead of submitting the plants to a renewed study, whereby surely some new characters would be discovered; the only thing "new" to be found in such systematic works seems to consist in nomenclatorial changes: new combinations and new genera, based on specific rather than generic characters.

It is therefore to be hoped that Canadian botanists will undertake the work of studying such plants of their own, which need a revision, and, for instance, the *Violaceæ* would no doubt prove to be interesting from a biological view-point, besides that a close study of the various organs might reveal new characters of importance to the distinction of several critical species.[1] Some of these characters may be sought in the structure of both the perfect and cleistogamic flowers, in the leaf-variation, the structure of the rhizome and in the development of root-shoots. Having studied the genus from time to time, the writer thought that the publication of some observations upon the structure of these organs might be of some interest to Canadian botanists, besides that these notes might indicate the line of work to be pursued. We might begin with

THE FLOWERS.

Two kinds of flowers are known to occur in the genus *Viola*: the perfect, which we know is to be found in all the species, and the cleistogamic, which is far from uncommon, but which, nevertheless, seems characteristic of certain species, or perhaps better of certain sections of the genus; it is absent in *Viola pedata* and *tricolor* for instance. The perfect flower is, as we remember, hermaphrodite and zygomorphic, *i.e.*, symmetry in one plane; the sepals are prolonged backwards beyond their point of insertion, they are glabrous or hairy, often ciliate, and we have noticed much variation in their shape and in the length of their appendages; the corolla is polypetalous with the anterior petal larger and, sometimes, of a different outline from the others,

[1] The very work suggested by Dr. Holm is now being carried on at the Central Experimental Farm by Dr. James Fletcher, who has under cultivation there all the Ottawa species and many from other parts of Canada. The results of Dr. Fletcher's studies will doubtless be given to the Club when they have been completed.—EDITOR.

besides that it bears a spur of variable length. The five stamens are closely applied to the ovary ; they have short filaments, and at their summit generally a membranaceous appendage formed by the prolongation of the connective ; the two anterior stamens are provided with a spur-like nectary, which protrudes a considerable distance into the petaloid spur ; this nectary shows several modifications in North American species and ought to be studied and described in the diagnoses. Finally, the ovary has a club-shaped style and bears the stigma in a groove on the anterior side.

These perfect flowers are, however, far from being always fertile, and it appears, from our own observations, as if they are sterile in a number of the acaulescent, purple-flowered species, at least in the vicinity of Washington, but whether these same species behave in the same way further north would be worth while determining. The other kind of flower, the cleistogamic, is often, but very incorrectly described as "apetalous," evidently from the fact that it has not hitherto been carefully examined in this country. The term "cleistogamic" is thus designated to such flowers as remain closed, in which the petals are merely present as rudiments or, sometimes, totally absent, and in which the stamens are reduced in number, besides that their anthers are small and contain but a few pollen-grains, which generally emit their tubes while still enclosed in the anther-cell. The pistil is in these flowers smaller than in the perfect ones, and the stigma is often scarcely developed. These flowers nevertheless produce a larger quantity of seeds than the perfect, and they have, in a number of cases, the power of burying themselves in the ground, where the seeds thus become ripened, or they are borne on erect, aerial peduncles like the perfect flowers.

Cleistogamic flowers are known from very nearly sixty genera, especially among the *Papilionaceæ*, *Acanthaceæ*, *Malpighiaceæ*, in certain species of *Oxalis*, *Lamium*, *Linaria*, *Drosera*, *Viola*, etc., while they are rare among the *Monocotyledones*: *Juncus*, *Hordeum*, *Leersia*, *Amphicarpum*, *Commelina*, etc.[1]

In the genus *Viola* these flowers were known already to Dillenius and Linnæus, which is readily to be seen from their

[1] Compare Darwin : Different forms of flowers, p. 310.

diagnoses of *V. mirabilis:* "*Viola* montana latifolia, flores ex radice, semina in cacumine ferens Dill.," and "*Viola* floribus radicalibus abortientibus, caulinis apetalis seminiferis Linn." But besides *V. mirabilis* a few other old world species of the genus are known to produce cleistogamic flowers as, for instance, *V. odorata*, *silvatica*, *canina* and *persicæfolia*, some of which have been described and figured by Professor Warming in his Manual of General Botany (1895. p 546.). The structure of the cleistogamic flowers is not, however, identical in all the species, and in regard to the North American species we have noticed some peculiarities, which may prove useful in the distinguishing of certain species.

The cleistogamic flowers remain constantly closed in the species which we have examined, and the general aspect is like that of *V. Macounii*, figured on our Plate IV, fig. 1, and the flower is nodding like the perfect. The sepals are normally developed and show a very prominent ciliation, but the petals are merely present in the shape of small warts; only two stamens are developed, (fig. 2) and in their natural position they are closely applied to the pistil. These stamens have large connectives, prominently denticulate along the margins, and the anthers are small and contain as usually only a few pollen-grains. The pistil has a short curved style, but no proper stigma is developed. These cleistogamic flowers of *V. Macounii* are sometimes buried in the ground, but at other times they are raised above the surface, borne on almost erect peduncles. It seems as if this varied position is due to atmospheric conditions; we have at least noticed that in several other species these flowers are only buried in the ground when the season is very warm and dry, while they develop above ground when the atmosphere is damp and cool. In *Viola papilionacea* the cleistogamic flowers are, thus, not always underground, and they differ from those of *V. Macounii* by having larger appendages on the sepals (fig. 5) and by these being glabrous. In this species there are, also, only rudimentary petals and only two stamens, which are somewhat larger than those of the former species. But in *V. sagittata* the cleistogamic flower is very much different. The appendages of the sepals (fig. 8) are long and narrow; the anterior petal is plainly developed

(fig. 9), and there are three stamens (fig. 12), of which, however, only two have both anther-cells developed. One of these stamens has always, as in the preceding two species, the connective folded around the style and stigma, as shown in figure 10, and the structure of the anthers and the connective is identical. The cleistogamic flowers are in this species, *V. sagittata*, constantly raised above ground on erect peduncles of quite considerable length, and it appears as if the position of these peculiar little flowers might constitute, if not a specific, then at least a sectional character. And in looking over the several species in which cleistogamic flowers occur, we notice that some of the acaulescent, woodland types: *V. papilionacea*, *Macounii*, and *villosa* show a tendency of burying the flowers in the ground, while the bog plants: *V. sagittata*, *blanda*, *lanceolata*, *primulæfolia*, *affinis* and *cucullata* always bear the cleistogamic flowers on erect peduncles; on the other hand, *V. emarginata* and *ovata*, both inhabitants of sandy, gravelly hill-sides, bear the flowers raised above the ground. This varied position observed in the cleistogamic flowers depends evidently upon the character of the substrate: humus, wet boggy ground or gravelly soil, besides that, the atmospheric conditions may not be excluded. If the flowers and fruits of the bog species were buried in the wet moss, they would, no doubt, be exposed to decaying, and it seems very natural that *V. affinis* always bears these flowers raised above ground, when it occurs in swamps or wet meadows, while it partly buries them in the ground, when growing in thickets, border of woods, etc.

Very peculiar is the mode of growth observed in *V. rotundifolia*. The perfect flowers are in this species plainly developed from the axils of the basal leaves: acaulescent, while the cleistogamic are borne in the axils of cauline leaves: caulescent; it appears as if the stems which bear the cleistogamic flowers in this species are mostly subterranean, but we have seen one instance, however, where a stem bore a few green leaves instead of merely scale-like. In *Viola orbiculata* it is interesting to see that two sets of aerial stems with green leaves and flowers develop in the same season, and that the flowers of the first set are perfect and very showy, though sterile, while the later developed are all cleistogamic and closed, but produce seeds.

While thus cleistogamic flowers appear to be common to a number of species of *Viola*, there are certain North American species in which they are absent, for instance, *V. pedata* and *rostrata*. In *V. striata*, *Canadensis*, *pubescens* and *glabella* we have observed a few instances where the last developed flower was merely rudimentary, but with no signs of producing any seeds, while such were produced by all the perfect ones on the same stem. And in *V. sarmentosa* we have not succeeded in detecting a single cleistogamic flower in our herbarium specimens, and not in *V. Langsdorfii* either. We hope, however, that Canadian botanists will re-examine these species in the field, more especially the two last mentioned, since it is very important to learn something about the structure of the cleistogamic flowers in general in others than those described above

VARIATION IN LEAF-OUTLINE.

When numerous leaves develop from the same bud as in the monopodial, acaulescent violets, certain variation becomes always more or less noticeable in the leaves. Those that develop first, before the flowers, are frequently different from the later ones, and in certain species, *V. papilionacea* and *palmata*, for instance, the first of these are generally cordate or reniform, but entire, while the later ones, sometimes, are more or less deeply lobed. In *V. sagittata* the variation in leaf-outline is quite considerable, and we have, sometimes, noticed a number of forms upon the same individual during one season, from the oblong-ovate to the lanceolate, with the base hastate, or from the deltoid, entire to the deeply lobed, the latter being characteristic of the so-called *V. emarginata*. Such variation seems largely due to the position of the leaves in the bud, but there are, also, cases where the nature of the surroundings seems to affect the leaf-shape. *Viola emarginata*, for instance, does not develop the deeply cut leaves except when it grows in rich soil and in shade; in open places and in sandy soil the leaves become entire and often quite narrow like those of *V. sagittata*. *V. palmata* has always the later leaves deeply lobed, when growing in woods, while *V. papilionacea* shows a pronounced lobation, when observed in damp, shaded places, along creeks, etc.

The caulescent violets show but a slight variation, which m restricted to the mere serration or crenulation of the leaf margin. But the most conspicuous variation is to be observed in *V. pedata*, if we compare the leaves of the mature plant with those of the rootshoots. Some of these types of leaves are figured on our plate (Plate V, figs. 13-16), and we notice the great divergence between the normal leaf (fig. 13) and the smaller one (fig. 14), which was taken from a one year old specimen. In the rootshoots (figs. 15-16) the leaves show a tendency to becoming almost entire, and one would hardly have suspected them to belong to this species, if it were not for the fact that we succeeded in preventing them from breaking off when the mother-plant was lifted.

Considering these few but well marked cases of leaf-variation in *Viola*, we might suppose that several of the recently described new species, in which the outline of the leaf constitutes an important part of the diagnosis, may be referred to some single type with ability to adapt itself to the surroundings, and to exhibit a certain amount of variation. And we must remember that besides varying in leaf-outline these same species do, also, vary in respect to the pubescence, which is still more influenced by the conditions of the surroundings, character of the soil, light and shade, etc., and it can, of course, only be ascertained through prolonged study in the field whether such plants are sufficiently constant in their mode of growth so as to be considered as valid species.

THE RHIZOME.

Few organs are as constant in their structure as those which constitute the rhizome, the under-ground stem-portion, with its leaves and roots; yet it is very seldom that recent authors pay much attention to this part of the plant, when they describe new species; in regard to *Viola* it is generally passed by in silence. The following types of rhizome are observable in the Canadian perennial species of *Viola*:

A. Rhizome vertical, monopodial, leaves all basal with axillary flowers:

V. pedata.

B. Rhizome horizontal, otherwise as in A :

V. sagittata, affinis, Macounii, cucullata, palmata, papilionacea.

C. Rhizome horizontal or ascending, monopodial, with basal leaves from the axils of which aerial stems develop with leaves and flowers, but no stolons :

V. pubescens, glabella, orbiculata.

D. Rhizome a sympodial pseudorhizome with basal leaves, etc., as in C :

V. Canadensis, striata, rostrata.

E. Rhizome horizontal, monopodial, leaves all basal with axillary flowers and stolons with scale-like leaves :

V. Leconteana, primulæfolia, Selkirkii, blanda, lanceolata.

As may be readily seen from this table, the monopodial ramification seems the most characteristic, while the sympodial occurs only in a few species. Of these two kinds of branching, the monopodial is in *Viola* recognized by its continuous growth in one direction and by its terminal bud developing only leaves with axillary shoots : floral or vegetative, of which the latter continue the same development of leaves and without being terminated by a floral axis. These lateral shoots, however, do not attain the same length or the same strength as the mother axis, unless in cases where this becomes injured and dies off. It is thus characteristic of the monopodium that the terminal bud remains vegetative and for an indefinite period.

The sympodial rhizome is in *Viola* but sparingly represented, and as a matter of fact it does not occur as a true rhizome in the stricter sense of the word. We have called it a pseudorhizome, because the under-ground stem-portion is here (in *V. Canadensis*. etc.) only represented by the bases of the aerial shoots, from the lowermost leaf-axils of which buds develop, which in the following season grow out into above-ground shoots. But there is no under-ground mother-axis in these species, and, moreover, each bud becomes terminated by a floral shoot with cauline leaves and axillary flowers. And it is seen without much difficulty when we examine *V. Canadensis* that the fresh, flowering shoots are, always, borne upon the base of an old, withered stem from the previous year. One might suppose that *V.*

pubescens, *glabella* and *orbiculata* ought to be reckoned of the same group as *V. Canadensis*, but in these species as well as in the more southern *V. hastata*, the above-ground stems are readily seen to have developed directly from the rhizome and in the axils of leaves, pertaining to the terminal bud. In other words, their rhizome represents a monopodium just as typical as the one described above, with the only difference that in the one case only flowers develop, while flower-bearing stems develop in the other. These flower-bearing stems die down to the ground without leaving any basal buds for reproduction; this is secured by the terminal bud of the under-ground main-axis.

In *V. pedata* the rhizome is constantly vertical; it is rather short, but quite thick, and the primary root persists for about two years. In *V. papilionacea*, *affinis*, etc., the rhizome is horizontal, somewhat longer, but the internodes are barely visible. The thickness of the rhizome is in these species (B) as well as in *V. pedata* due to the swollen bases of the petioles, as we have described in a previously published paper.[1] In *V. primulæfolia* and its allies (E) the rhizome is quite slender, and these species are characterized by their more or less profuse development of long, very slender, subterranean stolons, each of which becomes terminated by a rosette of leaves like the mother-shoot, and in which the same monopodial branching takes place.

The peculiar instance of both caulescent and acaulescent flowers developed upon the same rhizome is illustrated by *V. rotundifolia*, as described above. However, our material was rather scant of this species, thus we were unable to make out whether the cleistogamic flowers are borne on stems that are aerial or subterranean under normal conditions.

In *V. sarmentosa* we have a type which is very different from all the others on account of its sarmentose habit. The stolons are, as it appears from our dried material, always above ground, inasmuch as they all bear typical stem-leaves, but scattered, not forming a rosette as in the monopodial species. None of our specimens showed any rhizome, but they were all developed from stolons, which had rooted and become separated from the mother

[1] Memoirs of the Torrey Botanical Club. Vol. 2, No. 3, p. 66.

plant. Canadian botanists are urgently requested to study this species in order to explain its mode of growth from young to adult stage, and especially to demonstrate the structure of the rhizome and of the cleistogamic flowers, if such are present.

In comparing the rhizomes of these Canadian violets with European species, it is interesting to notice that there is only one, *V. mirabilis*, which exhibits the same growth as *V. rotundifolia*, and that these two species are not to be considered as near allies, since the former has the flowers light purple, the latter, on the contrary, yellow. In *V. odorata* the rhizome is monopodial and the flowers as in our acaulescent species, but there are also runners, which stay above ground and which develop rosettes of leaves at their apex, thus repeating the growth of the mother-rhizome. The caulescent *V. sylvatica* and *V. Riviniana* agree in all respects with *V. pubescens* and its allies, while the pseudo-rhizome of *V. Canadensis* is readily recognized in the European *V. canina*, *stagnina*, *elatior* and a few others, which have been described by Professor Hjalmar Nilsson.[1]

THE ROOTS.

The primary root persists for about one season in these perennial species of *Viola*, but is soon replaced by adventitious, which in the monopodial types develop from the base of the petioles from four to five together, or scattered along the internodes of the stolons, as in *V. primulæfolia*, etc. These roots are usually of two kinds: nutritive and storage, of which the latter are quite common in the monopodial species of the groups A, B and C; they are not very thick, however, but possess, nevertheless, a large parenchymatic tissue of the cortex with an abundance of starch, and correspond well with this type of root as described by Dr. Rimbach.[2] No contractile roots were observed.

THE ROOTSHOOTS.

This form of shoot has only been observed in *V. pedata*, as described above, and we might state here, that the shoots develop at the tips of the roots and that they remain in connection with

[1] Acta Universitatis Lundensis. Vol. 19. 1882-83, p. 205.

[2] Berichte deutsch. botan. Gesellsch. Vol. 17. 1899, p. 18.

the mother-plant for at least two seasons; they commence to bloom in their second year. But in no other American violet have we, so far, detected rootshoots, and they are not very well known among the old world species either. Wydler and Irmisch noticed them in *V. sylvatica, Riviniana* and *canina*, and Professor Warming found them in *V. elatior*.[1] It would seem that they might be found among the corresponding American homologues, viz.: *V Canadensis, striata* and *rostrata*, and perhaps also in the species of the group C.

In considering the means of propagation, floral and vegetative, as possessed by these Canadian species of *Viola*, it seems as if those of the group E (*V. primulæfolia*, etc.) are the best equipped, since they produce stolons and develop seed-producing flowers besides; these species are, thus, able to wander and spread themselves over a larger area than the others, in which stolons do not occur. *Viola pedata*, with its short and plump, vertical rhizome, is, nevertheless, possessed of some power to wander by means of the rootshoots. But in all the other groups (B, C and D) the structure of the rhizome does not enable the individual to spread over any large area, and the principal distribution is in these species secured by the seeds, which are ejected with much violence and thrown to a great distance by a peculiar mechanism of the carpels. This manner of dispersing the seeds becomes, of course, much impeded when the cleistogamic flowers bury themselves; it may be for this same reason that the bog-species have their pods raised high above the wet, mossy substrate, by which the dispersion of the seeds become better secured than otherwise.

Brookland, D.C., September, 1903.

EXPLANATION OF PLATES.

PLATE IV.

Fig. 1—*Viola Macounii*. A cleistogamic flower, magnified.

Fig. 2—Same species. A cleistogamic flower laid open, showing five sepals, rudimentary wart-like petals, two stamens and the pistil, magnified.

Fig. 3—Same species. The pistil and the two stamens in their natural position, magnified.

[1] Botan. Tidsskr. Ser. 3. Vol. 2. Copenhagen, 1877-79, p. 63, and Botan. Notiser. Lund., 1884, p. 32.

Fig. 4—Same species. The apex of the pistil with the style and stigma, magnified.

Fig. 5—*Viola papilionacea*. A cleistogamic flower, with the sepals, excepting the appendages, removed ; the petals are represented by small, wart-like organs, and the stamens are closely applied to the pistil, magnified.

Fig. 6—Same species. A stamen showing the two anther cells and very large, ciliate connective, magnified.

Fig. 7—Same species. The pistil, magnified.

Fig. 8—*Viola sagittata*. A cleistogamic flower showing only the long appendages of the sepals and the pistil, magnified.

Fig. 9—Same species, showing a small petal, the anterior, two stamens and the pistil, magnified.

Fig. 10—Same species. The pistil and a stamen, magnified.

Fig. 11—Same species. A stamen with the anthers very irregularly opened, magnified.

Fig. 12—Same species. The three stamens of the flower, magnified.

PLATE V.

Fig. 13—*Viola pedata*. A typical leaf, of an old specimen collected in the month of August. Natural size.

Fig. 14—Same species. A leaf, one of the earliest developed, of a young specimen, one year old, collected in the month of April. Natural size.

Fig. 15—Same species. A rootshoot, collected in the month of June. Natural size.

Fig. 16—Same species. A rootshoot, collected in the month of June, showing various forms of leaves. Natural size.

ADDITIONAL NOTES ON SOME CANADIAN SPECIMENS OF "*LITUITES UNDATUS.*"

J. F. WHITEAVES.

Since the publication of a previous paper on this subject, in the October number ot this journal, additional information has been obtained in regard to some of the questions discussed in it.

In the first place, Dr. W. Y. M. Woodworth, curator of the Museum of Comparative Zoology at Cambridge, Mass., has kindly lent the writer the types of Hyatt's *Plectoceras obscurum*, so that it has now become possible to make a direct comparison between them and a large series of presumably authentic specimens of *Plectoceras Halli* (Foord). Such a comparison has resulted in the conviction that, although *P. obscurum* may be, and doubtless is, quite distinct from the *Inachus undatus* of Emmons, which Hyatt calls *Eurystomites undatus*, there is no appreciable difference, either in external form, in the surface markings, or in the shape and position of the siphuncle, between *P. obscurum* and *P. Halli*. The types of *P. obscurum* are three in number, one a comparatively perfect specimen from the Black River limestone at Watertown N.Y., marked 2077; and the others, two fragments from the Birdseye limestone at Watertown, each marked 2078. The specimen marked 2077 has nearly the whole of one side worn away, but the other side shows the general shape of the shell and its surface markings very well. It is about three inches and a half in its maximum diameter and consists of two entire whorls. The inner whorls, if there were any, are not preserved. Both sides of the specimen show that the whorls are at first so closely coiled that the inner half of the outer whorl is in close contact with the one that immediately precedes it, but that its outer half is free and slightly uncoiled. At the anterior end of the shell, the outer whorl is about twelve millimetres apart from that which immediately precedes it. And it would seem to be the body chamber, which occupies rather less than one-half of the outer whorl, that is free and separate. The surface markings are precisely similar to those of the fine specimens of *P. Halli* collected by Mr. Weston at Lorette. On the worn side all the septa but the last are obliterated, and the shape and position

of the siphuncle are not at all clearly shown. A label, in Hyatt's hand-writing, however, which accompanies the specimen, states that the siphuncle is "marginal and ventral" as it is known to be in *P. Halli*. The two fragments marked 2078 show neither the external form of the shell, the outline of the transverse section, nor any of the surface markings. One of these is a little more than about one-third of the outer whorl of a specimen which has been worn down in such a manner as to show a longitudinal section of the body chamber and of the last five septa, which average from five to five and a half millimetres in their greatest distance apart. The other shows scarcely anything, except that the venter is much flattened.

In the second place, *Plectoceras Halli*, which seems to be a very characteristic fossil of the Black River limestone, has now been found at two localities near Ottawa city. The first of these is Lot 4, Concession 3, Rideau front, Gloucester, where the specimen referred to in a former paper was found by Mr. Walter R. Billings. The second is Mechanicsville, on the Ontario side of the Ottawa River at La Petite Chaudière rapids, where a specimen which shows both the surface ornamentation and the position of the siphuncle remarkably well, was found by Mr. J. E. Narraway in October last.

In the third and last place, on a tablet in the Museum of the Geological Survey there are four fossils from the Black River limestone at St. Ambroise, P.Q., collected by Sir W. E. Logan in 1852, that are still labelled "*Lituites undatus*." Three of these are apparently small specimens of *Plectoceras Halli*. The fourth is clearly neither that species nor *Eurystomites* (or *Plectoceras*) *undatus*. It is unfortunately not more than an inch and a quarter in its maximum diameter and does not show the position of the siphuncle, so that it is quite uncertain to what genus it should be referred. A similar but rather larger specimen, which also does not show the position of the siphuncle, has quite recently been found by Mr. Narraway in the Black River limestone at Tetreauville. Both of these specimens are apparently gyroceraconic, with laterally compressed whorls, and their surface markings consist of thin sharp ribs, with shallowly concave spaces between

them. These ribs curve concavely and rather widely forward on each side, and narrowly and convexly forward on the venter.

It would therefore appear that in Canada the true *Inachus undatus* of Emmons, which Hyatt refers to *Eurystomites* but which may be a *Plectoceras*, has only been found near Kingston, in the Black River limestone. Also, that all the specimens from that formation in the Province of Quebec which have been called *Lituites undatus*, and similar specimens from the Black River limestone near Ottawa, are either *Plectoceras Halli* (Foord) or an at present undetermined and possibly undescribed species, whose generic relations have yet to be ascertained. And that *Plectoceras obscurum* is a synonym of *P. Halli*.

ERRATA IN PREVIOUS PAPER.

On page 119, line 11 from bottom, for "losely" read loosely.
" 120, line 9 from bottom, for "1861" read 1891.
" 121, line 2 from top, for "*P. Foordi*" read *P. Halli*.
" 121, line 7 from top, for "sipuncle" read siphuncle.
" 121, line 8 from top, for "specimen" read species.
" 121, line 9 from bottom, for "surtural" read sutural.

Ottawa, Oct. 20th, 1903.

BIRD NOTES.

CANADIAN RUFFED GROUSE (*Bonasa umbellus togata*).—An incident illustrating the velocity of flight of the ordinary so-called Birch Partridge of this district, occurred in the middle of September last. As I was sitting at my office desk, I was startled by a loud crash of glass close above my head, accompanied by a shower of fragments. Upon examination, I found that one of the above-named birds had flown through the window. The pane broken was of thick double diamond glass, 3 ft. 4 in. long by 1 ft. 7 in. wide. The bird had been raised by a dog, about fifty yards from the building, and had flown straight at the window, possibly thinking it was an opening through which it could escape. The velocity was so great that the bird was killed almost instantly, and the breast bone and furcula or wish-bone were crushed.

PINE GROSBEAK (*Pinicola enucleata*).—On October 30th, on a lawn at the Central Experimental Farm, I saw and watched closely for some time a small flock of about a dozen Pine Grosbeaks, which were busily engaged eating the seeds of the small

Asiatic maple (*Acer Ginnala*), the fruit of the Berry-bearing Crab (*Pirus baccata*), and the berries of the Mountain Ash. None of these birds had the rich plumage of the adult male. I cannot remember in previous years noticing any of these birds so early in the autumn. Mr. Harrington, however, tells me that he saw about a hundred of them on the ground and in the trees along Meech Lake, Que., on the previous Sunday, October 18th. Mr. W. E. Saunders also saw them at Rat Portage in October, but this last named locality is of course much nearer to their breeding grounds than we are.

The chief object of this note is not, however, so much to record the occurrence of these birds as to urge the members of the Field-Naturalists' Club to try and prevent the senseless destruction by thoughtless boys of these beautiful and delightfully tame winter visitors. They are so tame and confiding that without the slightest difficulty they can be approached within six or eight feet. We have far too few of our bird friends which visit us in the winter, and all should do their utmost to protect those few which do come to us, as our guests, for food and shelter, in winter time.

Very few boys are really cruel ; but nearly all are ill-informed concerning the common objects of the country. Pointing out that a thing is wrong seldom has the effect of preventing boys from doing it; but might we not appeal to them by pointing out the cowardice of killing such beautiful and gentle creatures as these little birds, which do not make an effort to protect themselves and trust us so much, as hardly to get out of our way when we come within a few feet of them? Catching these wild birds and putting them in a cage is practically destroying them, because very few of those caught will live in a cage, and they are perhaps the least suited of all of our wild birds to be kept in captivity. Although the soft notes are charming when heard in a state of nature, the song is not such as would justify anyone for keeping the Pine Grosbeak in captivity. As cage-birds, they are large clumsy birds which scatter their food and make a great mess, and they soon become uninteresting to their captors. Lastly, they are Arctic birds which only come south in the winter, and, although with great care they may be kept through a summer, with the exception of perhaps one in a thousand, all die as soon as the hot weather comes.

JAMES FLETCHER.

NATURE STUDY—No. VIII.

THE PROPOSED COURSE IN NATURE STUDY FOR PUBLIC SCHOOLS.

S. B. SINCLAIR, Ph.D.

At the annual meeting of the Ontario Education Association in Toronto last Easter, a draft of "proposed changes in the Public and High School Courses of Study" was submitted for consideration, and in all probability these changes (with minor modifications) will come into effect at an early date.

In this scheme it is proposed to make a somewhat definite course of Nature Study compulsory for all classes in Public Schools, and to insist that all Public School teachers take an extended course of training in Natural Science before entering the Normal School. This forward movement cannot fail to be of interest to every reader of THE NATURALIST, and in future discussions it may be of value to know something of the content and sequence of the Nature Study material which is to be dealt with in the Public School.

The following is a brief outline of the proposed Course of Study for the first four classes :

FORM I.

NOTE.—From the character of Nature Study, the course therein must be more or less elastic, and a selection should be made therefrom subject to the approval of the Inspector. The acquisition of knowledge should be secondary to the awakening and preserving the pupil's interest in nature, and to training him to habits of personal observation and investigation. The topics are suggested as suitable ones from which a course which will meet the conditions of the school may be selected ; but the treatment must be suited to circumstances, age, and experience of learners, and to the seasons of the year, accessibility of materials, etc.

Animal Life : Habits of pet animals, their care and food ; domestic animals on the farm, their care, habits and uses ; birds, their nesting, song, food, migrations in the autumn ; metamorphosis of a few conspicuous butterflies or moths.

Plant life : Work in school garden ; study of a plant, as a geranium or pansy, from slip or seed to flower ; caring for plants in pots ; buds, their preparation for winter, their development ; autumn leaves, collection, forms, tints; economic fruits, collection, forms, how stored for winter, fruit as seed holders, dissemination

of seeds ; roots and stems, comparison of fleshy forms, uses, how stored for water.

Life on the Farm : Harvesting, primitive and modern methods compared ; preparation for winter ; the barn and its uses ; activities of the farm during winter ; winter sports and social life on the farm ; the varied operations of spring time.

Observations of rain, snow, and frost ; spring time as awakening to new life, effects of sun and moisture on the soil.

FORM II.

Course of Form I. continued. Animal Life. Life history and habits of domestic animals and familiar wild animals, as squirrel ; earth-worm, habits, structure, uses ; toad, habits, structure, uses ; observation of live insects and their activities, comparison of young and adult stages.

Plant Life : Cooperative and individual work in school garden ; cultivation of plants in pots with observation of the development of leaves and flowers ; parts of leaves and flowers ; change of flower to fruit and fruit to seed ; functions of the parts of flowers ; the forms and uses of trees ; activities connected with forestry and lumbering, connect with study of pioneer life and present conditions on the prairie.

Different kinds of soil, as sand, gravel, loam, leaf-mould, and clay ; experiments to ascertain how soils are composed, whether of mineral or of decayed organic material, and which best retains water ; additional phenomena of spring in the vicinity of the school, cause of melting snow, floating ice, etc. ; how nature prepares the soil for growth of plants.

Observation of farm, garden and household operations.

FORM III.

Course of Form II. continued. Animal Life : Adaptation of different kinds of animals to their respective habits ; birds, life history of types, habits of wild fowl in different seasons ; fish, forms and uses of different parts of the body, food and how obtained ; life histories of moths, butterflies, beetles and grasshoppers ; useful insects, as ladybird and dragon-fly ; harmful insects and methods of destroying them.

Plant Life : Germination of seeds under controllable condi-

tions and in the school garden ; more particular study of the forms and functions of the parts of plants, and variations in these forms and functions in different plants ; observations on the culture of farm and garden crops and orchard and shade trees ; the observing and the distinguishing of the common forest trees.

Observing local minerals and rocks, their properties and uses ; experiments on different kinds of soil ; distinction between hard and soft, pure and impure water, test and methods of purification of water.

Sources of Heat : Experiments to show the effect of heat in the expansion of solids, liquids and gases ; practical applications. Temperature ; thermometer, construction and graduation. Methods of transmission of heat, conduction, convection and radiation ; causes of winds and ocean currents ; ventilation.

FORM IV.

Course of Form III. continued. Animal Life : Relation of fishes, birds and wild animals to man ; life histories of conspicuous and economic insects ; organ and functions.

Plant Life : Study of organs of plants and their functions ; study of economic and wild plants from seed to fruit in the school garden, home garden, farm and forest ; weeds injurious to crops and methods of destroying them ; buds and twigs ; wood, rings, grain, and bark, uses, etc. Experiments to show composition of soils and their relation to drainage, temperature, etc. ; varieties of soils adapted to different crops ; fertilizers, etc.

Implements and tools used on the farm and in the household, mechanical principles applied in their construction.

The atmosphere, its composition. Combustion : simple experiments, study of candle flame products. Changes produced in the air by respiration. Reciprocal relation of plants and animals as regards the atmosphere ; impurities in air. Gravity : air and liquid pressure ; the barometer. Cohesion and adhesion, the nature of these forces ; phenomenon of solution and diffusion ; amorphous and crystalline forms of matter. Practical use of heat, steam and electricity in connection with the study of industries.

FORM V. AND CONTINUATION CLASSES.

The work outlined for this class is too extended to allow of reproduction here. It includes definite courses in Botany,

Zoology, Physics and Chemistry, based upon work taken in previous classes and treated by a more purely scientific experimental method.

THE TEACHER'S PREPARATION.

The courses of study in the High Schools are to be taken up in three main divisions ;

(*a.*) Lower school, covering from two to three years ;

(*b.*) Middle school, from one to two years, and

(*c.*) Upper school, two years.

Teachers seeking Junior Non Professional standing are to be examined on the Experimental Science of the Lower school course and the Physics and Chemistry of the Middle school course.

Physics and Chemistry are to be taken during four years instead of during one or two, as is now the case. These subjects are to be taken only during the winter months, in the Lower school course, Botany and Zoology being taken during the fall and spring months.

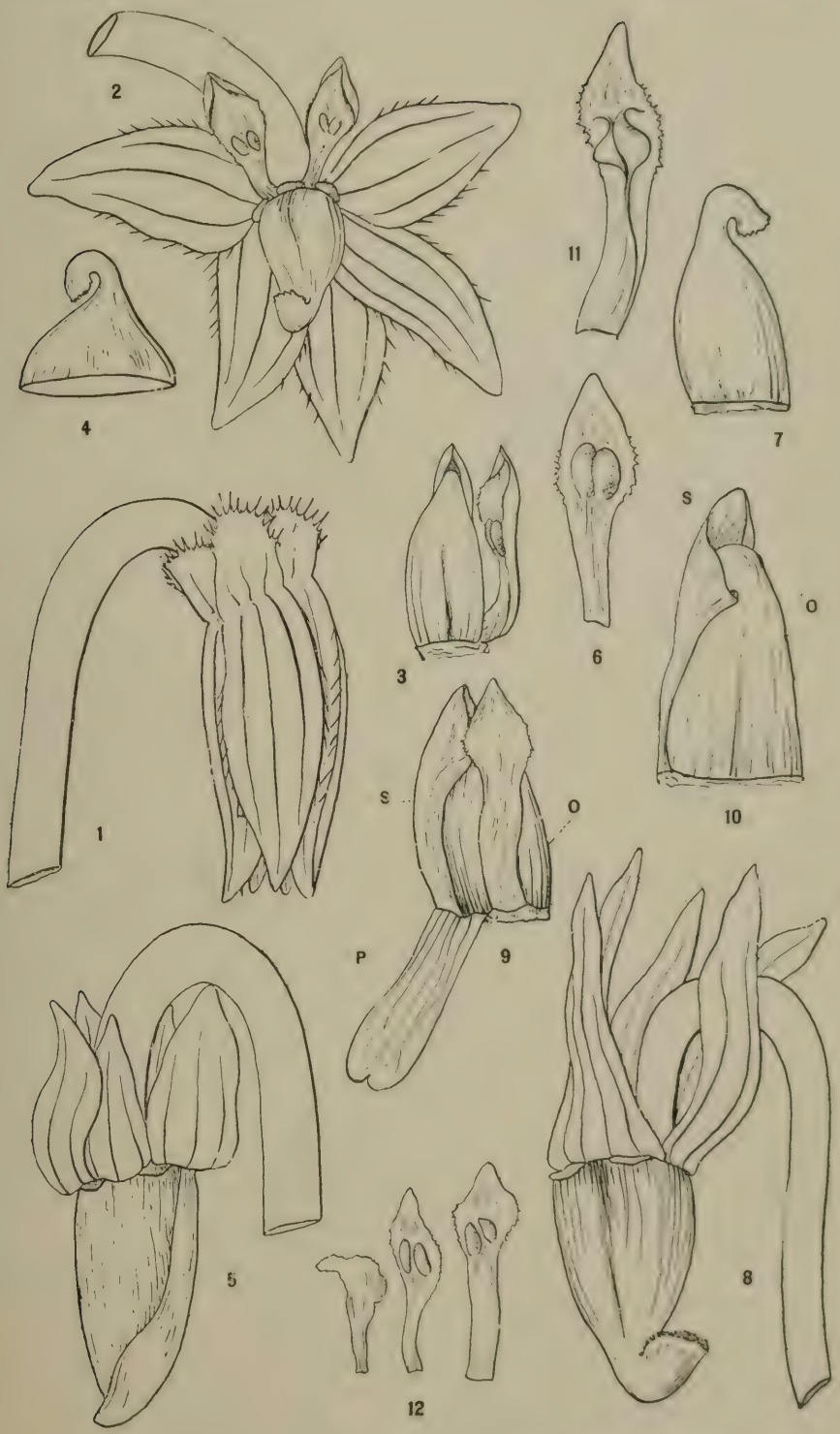
The course in Botany includes a study of representatives, such as flowering plants, ferns, fungi, etc., and deals with structure, life-relations, plant societies, plant physiology, etc.

The course in Zoology is designed to include representatives of the animal world. Special attention is directed to insects and birds, life-history, habits, adaptation to climate, etc.

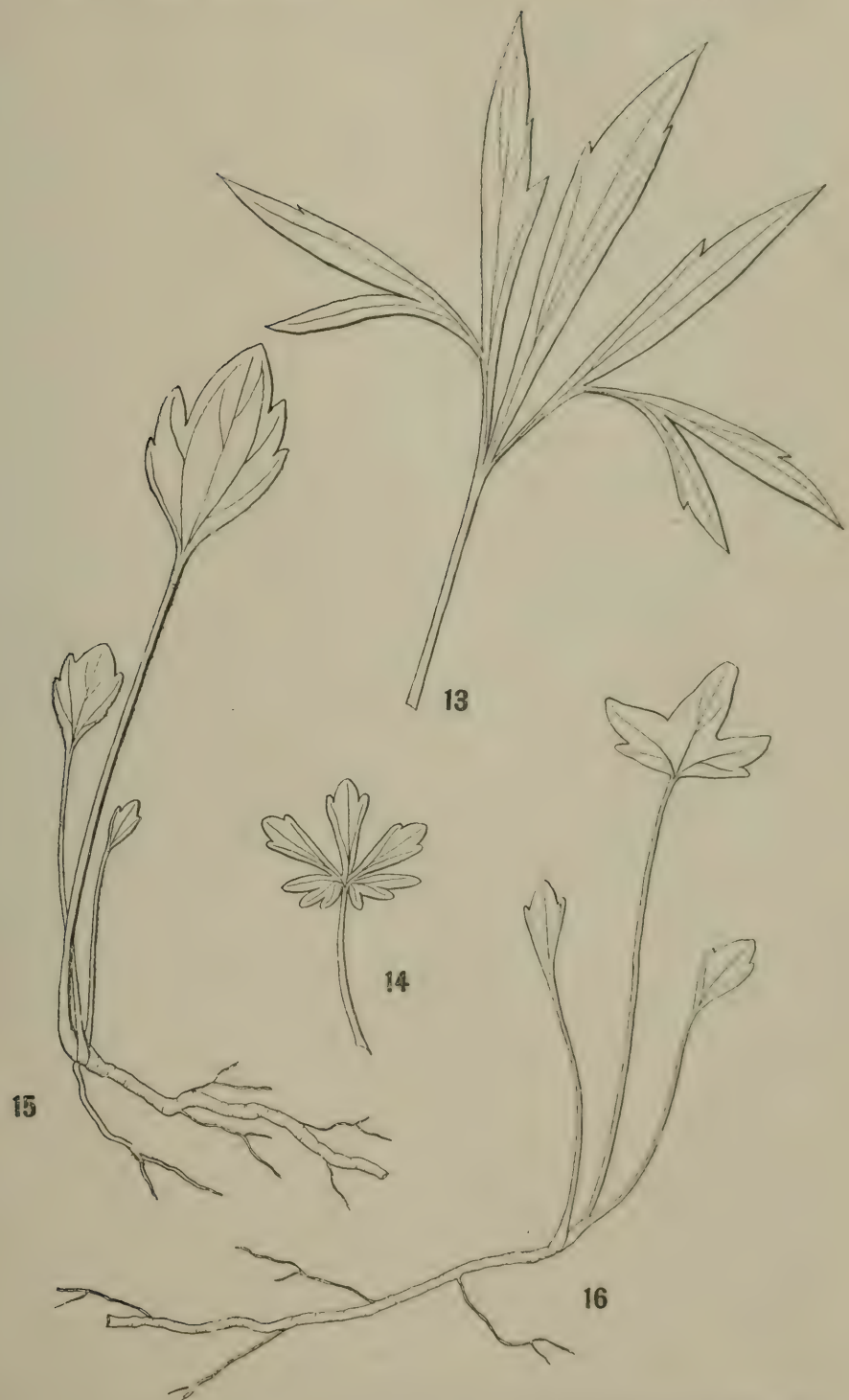
In both courses the work is intended to be practical, and, to ensure this, class text-books are not to be allowed.

Speaking generally, the proposed course in Natural Science (compulsory for teachers in training before entering the Normal School) will extend over from three to four years and occupy one lesson period per day.

During the Normal term the teacher in training will review the work done in the High School, and reconstruct it from the standpoint of the learning process. On the psychological side, he will study the subject in its logical sequence and in its relation to the needs and powers of the developing mind, with a view to the proper selection and arrangement of material and to the best methods of presentation. On the historical side, he will familiarize himself with the best of what has been done and is being done elsewhere, in order that he may avoid errors and avail himself of the advantages of past experiment. With such an equipment by way of preparation, the teacher who possesses growing power and enthusiasm, should be able to render efficient service, and this is an important consideration ; for, after all, the success of the movement must rest very largely in the hands of the teacher.



Holm: Notes on Violets. Cleistogamic flowers.



Holm ; Notes on Violets. Leaves and root-shoots of Viola pedata.

THE OTTAWA NATURALIST.

VOL. XVII. OTTAWA, JANUARY, 1904. No. 10

REMARKS ON SOME MARSH DWELLERS.

By LEWIS M. TERRILL, Montreal.

(Read before the McIlwaith Ornithological Club.)

Not having previously had access to a locality suitable for the study of waterfowl, on June 6th, 1903, I decided to visit the marshes in Lake St. Francis, near Summerstown, Ont., about forty miles from Montreal.

During our drive from the station to the lake shore my friend pointed out a former nesting site of the sparrow hawk, a scarce summer resident in Montreal. Arrived at the lake, we had a short row to Stanley Island, where we found excellent accommodation at the Algonquin Hotel.

The waning light now warned us that we had barely time for a short survey of the island, and during our walk we noticed where a kingfisher had burrowed in the crumbling bank, while later, when darkness had fallen, we flushed a bobolink from its nest and eggs. Owing to continued drought, the cover afforded ground birds was very scant and this particular bird, ignoring concealment, had built her nest flush with the ground amongst last year's stubble, trusting to protective coloration, which was aided by the eggs being conveniently of a grayish appearance in place of the usual rich brown.

Before five o'clock next morning we were well on our way toward the nearest shallows, the chucking of gallinules our guide through the lifting mists. Arrived at the first marsh, distant one-half mile from the mainland, we took our first plunge, dispelling any lingering drowsiness and startling a pair of gallinules into hurried flight. A shallow platform of dead rushes fastened to reed stalks and elevated several inches from water level, was

soon found containing eleven eggs of this species (*Florida Gallinule*). Nearby, a floating mass of dead rushes, the home of a pair of pied-billed grebes, allowing that they were sometimes at home, held five eggs partially covered with rushes laid lengthwise of the nest.

Leaving the open water and coming to a more central portion of the island, we were in the home of the long-billed marsh wren, whose long tails were far more conspicuous than their bills. When startled from the rushes they appeared to have some definite destination in view and would solve the problem of getting there by a direct mathematical flight on quickly whirring wings, swerving neither to right nor left. Their globular nests were everywhere, and resembled those of the field mouse but were very strongly woven with rushes with a lining of feathery down from the bullrushes. The entrance was a small round hole in the side, which, in the first nest, I did not readily find, but later I observed that it invariably opened out between the rushes to which the nest was fastened. The nesting sites were chiefly in clumps of last year's rushes, when they were composed of dead material. Many birds, however, fastened their nests to the long rank grasses which covered the marshes where the water was only a few inches deep. In the latter choice, green grasses were used in building, the wrens thus blending the color of their homes with that of the immediate surroundings. Often three or more nests appeared to be the property of one pair of birds, those occupied being several yards apart. The surplus nests are probably built with the purpose of discouraging enemies, or possibly having cause to fear rising of water, the birds are not satisfied with their first attempts.

One nest that I found contained four eggs of a pure glossy white, without a sign of coloration. They were slightly malformed and almost globular in shape, measuring: .58 x 53; .58 x 52; .59 x 54; .57 x 53, averaging .58 x 53, whilst an average specimen of the normal egg measures .66 x 49. In two of these eggs incubation was somewhat advanced, whilst the other two were almost fresh. It has been suggested to me that these albino eggs might be the short-billed marsh wrens. The same idea caused me to stand in one and one-half feet of water for a

considerable time, though I was not rewarded with the sight of any other wren than the long-billed.

Referring to authorities, I find that measurements of eggs of the two species are practically the same. Taking these facts into consideration it would seem inconsistent that the first short-billed observed breeding in this locality, out of its regular habitat, should lay an unusually small set of malformed eggs, reminding one of badly formed clay marbles, in different stages of incubation, with measurements at variance with normal.

On a low boggy island, less marshy than others, and partially covered with alders, we saw several woodcock and snipe (Wilson's, I believe). Here we found the Sora and Virginia rails nesting. Their nests, miniature gallinules, though better hidden, were fastened low down amongst the long marsh grass, the birds acting much in the same manner as the bobolink in leading one from the nest, always rising several feet away.

From the further end of the island an ever increasing clatter notified us of the presence of a colony of black terns. They came and went, after the manner of their namesakes of the clay bank. Their apologies for nests were placed on slight elevations in boggy spots, where vegetation had slight chance, sometimes a rock, a piece of driftwood, or again a solitary tuft of short grass being chosen. The eggs were the landmarks, as the nests were barely noticeable without them. Another colony breeding in a marsh where the water was two or three feet deep, simply laid their eggs on the surrounding floating mass of reeds.

The only bare spot amongst the rank growth in this marsh was the home of a pair of terns.

I failed to mention that notes on the brown creeper and Hudsonian chickadee, appearing in a recent issue, were taken at Robinson, Compton County, 125 miles S.E.E. of Montreal.

A WOMAN'S VISIT TO A PEAT BOG. PLENTY OF FUEL FOR CENTURIES TO COME. A VISIT TO THE NEWINGTON PEAT WORKS.

After an early breakfast, which to a woman living in chambers, with the aid of a gas stove, was a thing of despatch, a woman journalist, a fair-haired teacher in a Ladies' College, and a bright, joyous enthusiast with the breeziness of a Canadian prairie characterizing her, set out from Ottawa on a tour of investigation.

At the Central Depot a train on the Ottawa and New York Railway was boarded, and the party was augmented by the addition of five scientific men: a geologist, a chemist, and botanists and entomologists—men whose names are household ones in Canada.

It was a mid-October morning, a morning with the wine of joy in it, clear, mellow, with the faint scent of frost in the air. With Lampman we sang—

> "Silvery-soft by the forest side,
> Wine-red, yellow, rose,
> The Wizard of Autumn faint, blue-eyed,
> Swinging his censer, goes."

The scientific men were armed with botanical cases and kodaks, the weaker sex with lunch boxes, and magazines, which were never opened until the return journey.

The officials of the Ottawa and New York Railway were polite and attentive, the cars ran easily, and after a pleasant journey of perhaps an hour and a half, the neat little station of Newington was reached, forty miles from Ottawa. Here wraps were deposited, and a walk of over two miles on the rail-tracks was taken.

With jest and good-humoured raillery, here and there in spots, little earnest discussions on the plants, insects, and birds discovered in passing, were indulged in. At last the tall chimneys and brick walls of the Newington Peat Works were seen in the distance, and, following the switch on the railway track, we came to our destination. Here we were met by the energetic president, Dr. Spencer, and his efficient manager, Mr. Gray, who were kindness itself in explaining all about the works. A number of

men were engaged in conveying the brick-like blocks of peat that issued from a great iron machine in continuous procession, to large iron tramcars, which were run on rails into the huge brick drying chambers on either side of the driveway. Massive iron doors, studded with iron bolts, shut in the tramcars with their precious burden with a clashing sound, and then the heat was turned on, fierce, terrific, the furnaces, when the doors were opened for a second, belching out fire and smoke like Dante's Inferno.

To the scientific of the party the process of heating and draughts was explained. Behind the furnaces were rows and rows of peat blocks, drying in the sun and air to be used in the furnaces.

Then we were taken to the bog. A narrow trestlework, supported a cable-like arrangement by which the peat was carried in something like the conveyors in a flour mill, the lower ones from the bog full of peat, the upper ones returning empty.

Our three dauntless females followed their attentive guide on this very narrow pathway, a tight-rope feat bravely carried out despite the instructions of the fatherly one of the party, who held his breath between times and occasionally ejaculated "Don't talk," "Go slow," "Watch your footsteps." Once we did look around to see the deep-voiced one of the party taking a snap shot of us on our perilous journey.

At last the opening in the bog was reached, where the derricks were placed, with knives descending and clasping the peat and bringing it to the surface. Here it was shovelled aside to dry, by a stalwart German in overalls, who might be a study for a painter or sculptor, with his grace of action and magnificent proportions. The cranks of the derricks were turned by the ladies of the party, and only once they struck a snag and needed assistance. We learned that as soon as the space is large enough steam dredges will be set to work bringing up larger quantities of peat.

It takes Nature fifty years, it is said, to make a foot of peat, and, as the bog here has over thirty feet of peat, as was shown by a slender iron rod driven down for our benefit, one can imagine how almost inexhaustible is the supply.

This "household fuel" is economical, clean and non-odorous.

It will burn in almost any stove, or in the open grate, and it can be regulated at will. Industrial coke is made by carbonization, it welds steel and iron admirably and will stand burden in furnace. The by-products are valuable; these are obtained from coke making and distillation.

The machines and diggers used are from Europe and have many medals for efficiency; they are the first imported into Canada. The Newington plant will turn out 50 tons of fuel daily as soon as it is in regular working order.

Having armed ourselves with a quantity of the beautiful pink moss or sphagnum which forms a large proportion of this peat in its original state and which covers the surface of this bog for thousands of acres, with here and there scrubby spruces, larches and cedars, pitcher plants, and many swamp shrubs – Labrador tea, sheep's laurel, cassandra, andromeda, blueberries, etc.—we started on our way back.

At the works we were presented with blocks of peat in its finished state, ready for our grate fires, the scent of which would take some of us back in memory to the old home across the sea, and the hills of Wicklow would rise before our mind's eye, and care and sorrow be a thing of the past.

All the employees of the works were photographed, grouped in front of the buildings, and we took leave of our entertaining friends.

A brisk walk back to the town of Newington took but a short time, and we were ready for the good dinner which mine host of the "Newington House" had provided. There were no scientific disagreements on this excellent repast, but it was pronounced very good, and the pumpkin pie "just as good as a New England housewife could make."

We discovered in our walks that the town possessed four churches and a first-class public library (the latter without the help of Carnegie, but erected as a memorial to a worthy citizen), a cheese factory, with a bright, business-like proprietor, who informed us that the cheese was sent direct to Glasgow, Scotland; and, on sampling it, we found it very good. The business places were filled with up-to-date goods, and the post office evidently does a large mail business.

We were sheltered in the railway station during a sharp storm of rain, thunder and lightning, which had no effect on our spirits, and the evening train brought us back to Ottawa shortly after six in the evening, tired, but happy, with very pleasant memories of our Canadian peat bog.

M. McK. S.

Ottawa, Oct. 31, 1903.

The following description of the manufacture of fuel from peat has been furnished by Mr. D. B. Dowling, of the Geological Survey of Canada :

Experiments in Canada in the manufacture of peat have been carried on for many years, but were mainly unsuccessful because the attempts to drive off the moisture had been limited to mechanical means. Air drying, a long process, produces a fuel in which there is an average of 30 per cent of moisture. A quicker means of getting rid of the water is imperative, but the expense of mechanical pressure combined with other difficulties have led to the abandonment of that method. In some of the localities where the manufacture of peat fuel is going on, the process followed consists of partial drying, by first draining the bog which removes only the water which accumulates in the trenches and then partial air drying on the surface, to be followed by artificial drying by the application of heat either before or after the fashioning into bricks or bars.

Draining the bog allows of the transport of the material by portable tramways to the works and the partial drying of the surface. In wet bogs the transport is by water in barges, and when the work is on a large scale the digging is by dredges. At Beaverton the peat is dried in a rotary furnace and when in an apparently dry state pressed into bricks. The plan adopted at Newington is, for the initial stage, to dig the peat by a German machine which cuts out a vertical section by means of a box-like spade being forced down into the bed. This, on being lifted brings up with it the block cut out. The transport to the works is by means of an endless wire cable working in a trough, up which the peat is pushed by the carriers attached. It then falls into a hopper leading to the mixing machine, something like a

huge sausage mill. The macerated pulp issues from the spout in long continuous bars, which are cut by hand into short bricks and transferred to cars which are then run into the heated chambers for drying. The chambers are long brick structures which, when filled with cars of peat bricks, are closed and heated by a furnace at the end, the fumes from which are forced through the chambers by a fan or steam jet. Some experience is necessary in order to judge the amount of heat and time required to bring the drying to the proper point.

The fuel so produced is not in so condensed a form as when pressed after drying, but is more of the specific gravity of hardwood and is, perhaps, in better form for kitchen ranges, as it will make a quick fire.

Newington, situated only some fifteen miles north of Cornwall, is on the edge of the watershed between the Ottawa and St. Lawrence rivers. The country passed over on the trip from Ottawa is the gently sloping surface of a marine terrace. This was built up in the bottom of the gulf that was formed when the present land surface was emerging from the sea after its burden of ice was removed by melting. The surface was probably nearly level, but in the continental uplift all parts did not attain the same elevation, so that the gentle slope north may in part be due to this cause. It is now drained by several streams, the branches of the South Nation River, and in the trip over this part glimpses were enjoyed of bits of scenery not unlike parts of the sparsely wooded plains of the West. The drainage of the surface near the channels of these streams is so nearly complete that there are not many lake basins or swamps. Near the watershed between the smaller streams and along the height of land between the major systems undrained areas are more frequent. South of the station at Newington there are depressions on what seems to be a former wave-swept face of the terrace. The surface here is more undulating and several basins are found. The lapse of time since this land emerged from the sea, several thousands of years, has allowed the complete filling by vegetable matter of the shallow lake, which is here just at the height of land.

The area and depth of this bog our short visit did not allow us to determine, but the extent seems considerable and the depth

shown at parts near the southern edge is over 20 feet and farther in over 30 feet.

The submerged parts of these bogs consist of the dead and decaying portions on which flourish many growing mosses, sphagnums, and moisture-loving shrubs. Many of these peat bogs are found to be floating masses of vegetation from the bottom of which the disintegrated fibres as they lose their structure through decay slowly deposit over the bottom, layer on layer of a structureless mass of cells which form a brown material not unlike gelatine or soft celluloid. In the bog at Newington the surface does not seem to be floating but resting on the decayed mass beneath. The lack of drainage is shown in the filling up by water of trenches cut in the peat, thus allowing of the extraction of the peat from the bog only in a thoroughly saturated condition.

A VISITOR FROM THE SOUTH.

A fine specimen of the magnificent noctuid moth *Erebus odora*, Linn., was taken "at sugar" by the writer at Meech Lake, P.Q., on the 2nd August last. This is a rare insect in the Ottawa district. The species is a native of the West Indies and Mexico, but isolated specimens have been taken right across the Dominion, at St. John, N.B. (McIntosh); Montreal, Que. (Bowles); Ottawa (Fletcher); Toronto (Geddes); Orillia (Grant); Winnipeg, Man. (Hanham); Beulah, Man. (Dennis); Calgarry (Miss Moodie); Vancouver, B.C. (Bush).

Erebus odora, which bears the popular name of the Black Witch, is a strong flyer, and, as no instances are known of its breeding in Canada, all the specimens taken are supposed to have migrated from the south. It is one of the largest moths in the North American fauna, sometimes expanding nearly seven inches; the specimen here referred to is a female and measures 5⅛ inches across the wings, but a male taken by Dr. Fletcher in 1876 expands 6⅞ inches. This grand moth is figured in Comstock's "Manual for the Study of Insects" at page 297.

CHAS. H. YOUNG.

REPORT OF THE NINTH MEETING OF THE BOTANICAL BRANCH.

The meetings of the Botanical branch, which were discontinued during the summer months, have been resumed, the first having been held at the residence of Mr. W. T. Macoun, Experimental Farm, on Friday, October 23rd. There were ten present at this meeting, which was a good indication that the meetings will be well attended this winter. It was decided that instead of appointing a secretary to report the discussions for the whole season, each chairman or host should report the meetings for THE OTTAWA NATURALIST.

Dr. Wm. Saunders, who was present, exhibited some interesting specimens from the west, among which were: *Epilobium latifolium*, *Menziesia glabella*, *Rhododendron albiflorum*, *Pinus albicaulis*, and *Abies subalpina*, with its dark purple cones, from near Glacier; *Helenium autumnale*, from near Battleford; *Collomia linearis*, which is a crop pest about Saskatoon; and *Elæagnus angustifolia* from Medicine Hat. He referred to the great September snowstorm, and said that near Indian Head, although the snow fell to a depth of eighteen inches the wheat was very little injured by it. Dr. Saunders also referred to his work in originating hardy apples for Manitoba and the North-West by crossing *Pyrus baccata*, the wild Siberian crab, with the apple, and showed examples of the hybrids, which were about as large as Transcendent crabs. The flora of the Peace River was briefly touched upon by Mr. J. M. Macoun. He said that it was a surprise to him to find so few species, there being only about 200 in all. There were large areas of some species, such as *Astragalus hypoglottis* and *Hedysarum boreale*. Trees were represented by only seven species, namely two poplars, two spruces, one pine, tamarac, and one birch. While in that immense district only some 200 species of plants were found, the contrast between it and the Ottawa district was impressed on the members by Mr. Guillet's statement that he had found 28 species of plants on that little island in the Ottawa River off Bank street which is covered with water every year for a time. Among the number were six species of trees.

A discussion on the subject of thorns and spines was introduced by Mr Campbell, who had specimens of the thorns of *Gleditschia triacanthos*. There seemed a doubt as to whether this tree bore thorns or spines, but the conclusion reached was that whereas some of the younger thorns, which were really from supernumerary buds, resembled spines, not having a marked connection at first with the woody tissue, the older thorns were undoubtedly true thorns.

There was a number of interesting specimens shown by Dr. Fletcher, who referred briefly to each one of them. Among these was an interesting crab apple from British Columbia, apparently a natural hybrid between *Pyrus rivularis* and the apple, which had been sent by Mr. Orion Bowman, Upper Sumas, B.C. The fruit was larger than *rivularis*, being 1½ inches long by a little over one inch in diameter, and of better quality. *Ægopodium Podograria variegatum* which was shown is a variegated leaved plant found in many gardens, but the name of which is known by very few, as is shown by the frequent inquiries. *Matricaria inodora*, which is a weed in the Maritime Provinces, was shown by Dr. Fletcher to make a good cut flower, lasting a long time in water. He also had specimens of American mistletoe, *Arceuthobium Americanum*, parasitic on *Pinus contorta*, from British Columbia. Indian corn showing abnormal cobs among the male inflorescence or tassel. Some fine water color paintings of Manitoba wild flowers were also exhibited by Dr. Fletcher, framed in the method known as *passepartout*, which the exhibitor thought was worth bringing before the section as a very cheap and efficient way of saving such drawings and paintings as frequently come into the hands of a botanist.

The chairman read an article developing the economic aspect of Nature Study, and invited criticisms of the same. An animated discussion on the whole subject of Nature Study followed.

Prof. Macoun said that he had collected 958 species of flowering plants in the Ottawa district this year. Those present at this, the ninth meeting of the year, were Dr. Wm. Saunders, Prof. J. Macoun, Dr. J. Fletcher, Mr. A. E. Attwood, Mr. D. A. Campbell, Mr. C. Guillet, Dr. E. Blackadar, Mr. St. Jacques, Mr. J. M. Macoun and the chairman. W. T. M.

REPORT OF THE TENTH MEETING OF THE BOTANICAL BRANCH.

The second of the autumnal meetings of the Botanical Branch met at the residence of Mr. James M. Macoun, on Thursday, Nov. 5th. The members present were Messrs. Fletcher, John Macoun, Clarke, Guillet, White, Attwood, Blackadar, W. T. Macoun, St. Jacques, Campbell and J. M. Macoun.

After the minutes of the previous meeting had been read some specimens of the pepos of *Echinocystis lobata* were exhibited in which the fibrous structure was beautifully shown. The luffa of commerce is of the same order—*Cucurbitaceæ*—and the fruit of *Echinocystis*, when the cellular tissue has disappeared, resembles in miniature the towel-gourd, *Luffa Ægyptica*, the dried fruit of which is cut up and used as a flesh-brush. It is to be seen in any drug-store. The fibrous interior of these gourds is known in commerce under the various names louff, loof, loofa, lief and liff. Another species of Luffa—*L. acutangula*, the sponge-gourd—is called "the strainer-vine," from the use of the fibrous net-work contained in its fruit for straining palm-wine.

Growing plants of *Hepatica* and *Corydalis*, brought from the woods the day before, were shown by Mr. J. M. Macoun. These were about to flower, and a few days later the *Hepatica* was found in bloom by Dr. Fletcher. The occurrence of *Physalis grandiflora* only on burnt ground and never in abundance was commented on, but no explanation was suggested. Dr. Blackadar introduced the subject of the propagation of the Lombardy poplar, and in the discussion which followed it was brought out that only male specimens of the Lombardy poplar had been seen in Canada by any of those present and only female trees of the Abele poplar.

Dr. Fletcher told of the use of *Heuchera hispida*, alum-root, for the cure of diarrhœa by Indians near Rat Portage, Ont. In discussing reforestration by nature after forest fires Professor Macoun showed that in the years immediately following a fire poplar and birch making the quickest growth are most in evidence, the conifers growing more slowly not being seen; these appear later.

The conclusion of the report of this meeting will appear in the next number of THE NATURALIST.

NATURE STUDY—No. IX.

The Practical Aspect of Nature Study.

By W. T. Macoun.

It would be easy for the enthusiastic lover of nature to describe in glowing terms the wonderful beauty of a tiny flower or the marvellous markings of a crawling caterpillar, but by most persons the first would be considered an insignificant plant and the latter an ugly worm; and, although the enthusiast might study nature with such persons for days, it is doubtful if they would ever become true nature students, unless each, of his own accord and by himself, went forth and communed with nature, and, becoming inspired by personal contact with her, seized every opportunity to glean a few grains from her inexhaustible stores. It is when the student has reached this stage that the teacher will be eagerly sought out, for, once the desire for knowledge is born, the thirst for it is intense.

It has been strongly impressed upon the writer that the permanent success of the Nature Study movement will largely depend upon the demonstration of its practical value. This is a practical age, and things useful take a very prominent place in it. I believe, therefore, that our nature studies should begin with something that it is generally conceded we should know more about, such as the economic plants which produce our daily food, as wheat, barley, oats, Indian corn, roots of various kinds and fruits; the trees which are of greatest value for timber, furniture and other purposes; the animals, birds and insects which are beneficial and injurious; the soil, the air, the clouds, and, in fact, everything by which we live and move and have our being. These can be studied in such a way as to show their natural beauty, their structure, their life history, and their relation one to another, and, at the same time, studied with a view to obtaining some practical result and the developing of the power of observation. Excursions to the woods need not become rarer, but there should be excursions to the farm, the orchard and garden as well. If a real interest in, and a definite knowledge of, the growth and development of a pumpkin, for instance, or of a plant of wheat, is the result of nature studies with the student, it will then be

easier to create an interest in things which are not of as practical value; but much of the value of the lesson will depend on whether it promotes a spirit of investigation in the student and helps his powers of observation. Nature studies in class rooms should be with things with which the child will be sure to come in contact with through life. Be it what it may, some practical turn should be given to the study, although the arousing of interest in, and the creating a love for, the beauties and wonders of nature should always be one of the chief features of the lesson. Success in obtaining this object should be much more certain if one began with the practical and used the theoretical to aid him, than if one began with the theoretical and hoped to get something practical out of it.

The writer's main purpose in presenting this article is to show, if possible, that the amateur gardener, as a student of nature, combines the love for nature with the practical, in an almost ideal way. I do not refer to the amateur as opposed to the professional, but to the man, woman or child who grows and cares for plants mainly for the love of it; and it seems scarcely possible that one can be a true lover of nature unless, as far as his circumstances will allow, he prepares soil, sows seeds and cares for plants; for it is only in this way he can come into closest communion with nature and become best able to understand and appreciate the growth and development of the wild flowers and forest trees. From personal experience he finds that some plants succeed best in heavy soil and some in light; that some require much moisture and others comparatively little. His observation becomes keener, and he soon perceives that when growing in their native homes some species of plants will be found under certain conditions of soil and moisture, and others under different conditions. From his experience with beneficial and injurious insects, he appreciates far more than he could otherwise do, the effect these have on the growth and development of plants. He is brought into daily and closer relation with the birds and soon becomes familiar with their appearance and can identify all the commoner species.

It is a small garden, indeed, in which a robin or at least a chipping sparrow does not built its nest. Hence there is an opportunity for nearly everyone who has a garden, to study the

habits of birds. On their arrival in spring their song delights him; then there is the mating and building of the nest to observe; the laying of the eggs and the habits of the birds when brooding; the hatching, feeding and rearing of the young; the vacating of the nest; and finally the flight of the fledglings. What more delightful nature studies can we have than these? And these are what will draw us to the woods, where hundreds of such bird studies await us.

The smaller animals, also, receive a share of the amateur gardener's interest and observation. A certain gardener found one morning this autumn that something had been digging holes in various places in his garden. He thought, at first, that some cat had done this, but when night after night new holes were made, he decided to investigate the matter further. He looked about carefully for footprints and found some which did not look like those of a cat. He made a still closer examination, and in one hole a faint skunk-like odor was detected. But what could a skunk be making so many holes for? It was known that he fed on chickens and sucked eggs, but there were none of these here. Did he feed on the roots of plants? What could he be after? It was decided to ask someone who knew, and then the gardener learned that the skunk—which this turned out to be—which occasionally kills chickens and eats eggs, and sometimes annoys by his penetrating odor, is really a friend of gardeners and destroys many injurious insects among which are cutworms. And, if this skunk had been killed and examined, undoubtedly some of these insects would have been found inside it. On again looking at the holes, it was found that they were much more numerous in places where the soil was sandy and warm; and all gardeners know that in sandy soil cutworms are, as a rule, most numerous. Here was a nature study which would never be forgotten, and would lead to further studies of the habits of animals in the fields and woods.

The amateur gardener's joys, which are perennial, receive an annual revival when the New Year's seed and plant catalogues come in. What pleasant hours are spent in studying the names and descriptions of plants from Abronia to Zinnia, only the lover of plants knows. And then those glorious days in spring-time

when the thrill and ecstacy of life is in us and all about us! The turning of the soil and the feel of it in our hands! Even though our plants may later be destroyed by frost or cutworms, it is worth the labor just to feel that contact with the warm and steaming soil in spring. Then follows the sowing of the seeds, their germination, thinning to ensure perfect development, cultivation to conserve moisture, aerate the soil, and promote a healthy growth of the plant, the benefits of which are learned by experience and hence are never forgotten. With what expectancy he watches the developing flower buds, and when, at last, the tender petals expand, what pleasure is derived from studying the form and color of the perfect flower!

The vegetable garden furnishes ample food for thought as well as for the table. Its economic value is only of secondary moment to the true amateur. He grows his vegetables mainly for the love of it, and hence watches his crop with quite different feelings to the man whose livelihood depends on it. There are few methods of studying nature that are at once so practical and yet so delightful as gardening, for definite knowledge of nature's methods is here obtained by personal observation, which is one great object of Nature Study.

Not only is the amateur gardener a true student of nature, but he is a public benefactor as well. His garden is a delight to all who see it. It improves the appearance of the city, town, or place in which he dwells, and even if everyone who attempts to follow his example does not catch his enthusiasm and the true spirit, he will exert a very powerful influence for good.

One of the most hopeful turns which Nature Study has taken is the establishment of school gardens, where each child, with a little garden of his own, prepares the soil, sows the seed, cares for the plant, and where he should learn more about nature from his own practical experience than could possibly be taught him by another. If his garden is in a city, or town the child will probably be more interested at first in studying the growth of ornamental plants and perhaps of fruit and vegetables, for these are what he has been brought most in contact with, and, in the teacher's effort to create a love for plants and a definite knowledge of how they grow, success will be quicker and surer if he begins with known rather than with unknown objects. In the country, where pupils are likely to become farmers or farmers' wives, special attention should be paid to economic plants, such as wheat, oats, barley, pease, corn, potatoes, grasses, and roots of various kinds, and fruit. Here Nature Study will in part take the form of elementary agriculture, although the main purpose, as elsewhere, should be to uplift the mind of the child to a nobler conception of life.

THE OTTAWA NATURALIST.

VOL. XVII. OTTAWA, FEBRUARY, 1904. No. 11

OUR EAGLES AND OSPREYS.

Rev. C. J. YOUNG.

The eagle is a notable bird in every country, and the person who takes but little interest usually in the avi-fauna of his neighborhood, after seeing one, is very apt to say to his friend, "I saw an eagle the other day." But we must regretfully admit that this will soon be a remark of the past, so bitter is the war of extermination that is waged against these noble and comparatively harmless birds.

The bald-headed eagle (*Haliæetus leucocephalus*) is rapidly decreasing in numbers in Ontario, and the sight of a nest will be almost denied to the rising generation. The golden eagle (*Aquila chrysaetos*) has always been a rarity in this province. The former bird is occasionally observed in the winter; one or two are frequently seen in the vicinity of Kingston sailing along the shores of Lake Ontario; inland it is but rarely noticed until spring, on account of lack of food, I suppose. Up to the year 1895 two or three pairs always nested in the woods around Charleston Lake, County of Leeds, Ont.; at the present date one pair may possibly do so. One of these nests was located in a poplar tree, a most unusual building site, fixed in the limbs not more than twenty feet from the ground. The tree grew in a ravine just under the Blue Mountain which overlooks the lake. Another nest was in an oak, near Slim Bay, and which was occupied as lately as the year 1901.

The bald eagle also bred commonly along the St. Lawrence; south of Lansdowne, near Symonds Mt., a nest built in an elm being used for many years. The birds subsequently moved to a tall pine at the head of Landon's Bay, and raised their young

there in safety until the tree was blown down in 1895. They have now left the locality, a locality they had been accustomed to nest in for numbers of years no doubt,—and have gone elsewhere to breed. At Wolfe Island this bird nested until recent years, occupying a large elm near Long Point, at the head of the island. When this tree blew down the eagles built a nest at the head of Simcoe Island. There they occupied a high elm, which was climbed by a man of the name of Shelbourne in 1900; a feat that very few persons would care to undertake; and the birds again changed their abode. At present there are but one or two nesting places remaining at the eastern end of Lake Ontario.

Going inland, we hear of a few pairs of bald eagles along the Rideau, and at the lakes in its vicinity; and in the latter part of summer young birds as well as a pair of old ones might be seen at Sharbot Lake almost daily. But what destruction goes on; in the spring of 1903 a pair of these eagles selected a comparatively small hemlock for a nesting station near this lake. They successfully hatched their eggs, and raised their young until they could just fly. Then the nest was found by men engaged in peeling hemlock bark; the alarm was sounded, word sent abroad, and the tree was felled, the two young ones killed and left lying on the ground, and one of the old ones shot! Such is the fate that too often overtakes these birds, nowadays.

The golden eagle nests very rarely in Ontario. A nest seen by the writer was built in high rocks at Schooner Lake in North Frontenac, and was considered for a long time inaccessible until some river drivers let one of their number down from the top of the cliff by a heavy rope, and he managed to swing himself on to the ledge where the nest was located and secure the eggs. This was towards the end of April, a few years ago, and since, the nest has been deserted. In 1903, the writer visited the place, and suggested the means by which a man named Herbert reached the nest.

As with the eagles, so it is with the ospreys. They are rapidly being exterminated. A few years ago a nest located on a pine or hemlock stub was no uncommon sight in the back country; now it is a very rare sight. This bird is more partial to the neighborhood of small inland lakes than to the larger waters

and sometimes selects a tree quite away from the water The nest is almost as large as a bald eagle's, but built in a different situation. The osprey is a late breeder, the bald eagle an early breeder. The former usually lays its eggs—at least in Ontario – about May 20th, the latter about April 12th ; the golden eagle about the end of April. Where not harassed and molested the two former birds are vehement in defence of their nests, and greatly resent intrusion ; but I notice where they have been much disturbed, they lose spirit and do not come within gunshot of an intruder, hardly venturing to attack him if he climbs their tree.

I have not observed the osprey at Charleston Lake, or seen more than three nests in North Frontenac. One of these, in the township of Bedford, I visited with a friend on May 29th, 1903. It was built on a partially dead limb of a living maple, and is the only osprey's nest I have ever seen in a living tree. These birds were fortunate in hatching their young, which, I later learnt, they brought out in safety. But usually, as in the case of the eagles, the hue and cry is raised and the tree is either felled after the young are hatched or else the old ones are shot whilst incubating their eggs.

In some parts of North America the osprey is still fairly plentiful and is said to breed in communities, but this is not the case with our Canadian bird, which is invariably solitary, and only found in pairs widely separated. Again, in nesting, as mentioned above, the site is usually a pine, a tamarac or hemlock stub, the altitude varying from 30 to 60 feet from the ground.

In Scotland the nest was usually placed on some rocky island in a highland loch, or on a ruined tower, as at Loch Awe in Argylshire, and I believe on the coast of Maine, rocks by the sea coast or even the ground have been chosen, but not so in Ontario.

It is to be hoped these noble birds, both eagles and ospreys, may continue to enliven the beautiful lakes, and what remain of forests, in Ontario, but as matters are now proceeding, it cannot be many years before they become here, birds of the past.

PRESIDENT'S ADDRESS.

(Delivered December 15th, 1903.)

Members of the Ottawa Field-Naturalists' Club, Ladies and Gentlemen :—

Although this is but the 24th Annual Address which a president of this Club has had the opportunity to deliver, the 25th anniversary of the Club's organization will have passed before the next president has prepared the 25th Address. The Council of the Club has therefore thought it appropriate to celebrate the 25th anniversary at this time, and bring together as many of the original members as possible. While some of the first members are dead, it is pleasing to know that all of the original Council of the Club are alive ; that all of them, with the exception of one, the Hon. Joseph Martin, are living in Ottawa, and that nearly all of them are here to-night.

On the 10th of March, 1879, forty men assembled in the rooms of the Literary and Scientific Society to organize a club which would promote the study of Natural History in the Ottawa district. At this meeting the club was formed and given the name of the Ottawa Field-Naturalists' Club, which it has creditably borne ever since.

The officers for that year were :—

President : Lieut.-Col. White.

Vice-Presidents : J. Fletcher, W. D. LeSueur, B.A.

Committee : W. P. Anderson, C.E., W. R. Billings, W. H. Harrington, J. Martin, H. B. Small, M.D.

The Club had a very successful season, and by the close of the year the membership had swelled to 90. This year it is 254.

On looking over the Transactions of the Club and the seventeen volumes of THE OTTAWA NATURALIST, one is impressed by the enthusiasm of the members all the way through. How few clubs, societies or associations of twenty-five years' standing can show so fine a record? There is a reason for this, however. Once a man becomes an enthusiastic student of Nature he is always an enthusiast, and we have many men of this stamp in our Club of whom we are justly proud. We know so little about

Nature, it is so easy to learn more, and there is so much to learn, that we should be poor naturalists indeed if we did not show some progress.

The following is a list in chronological order of the men who have been presidents of the Club since it was founded :

Lieut.-Col. White	1879-80
Dr. James Fletcher	1880-83
Dr. H. B. Small	1883-85
Mr. W. H. Harrington	1885-86
Prof. J. Macoun	1886-87
Mr. R. B. Whyte	1887-89
Dr. R. W. Ells	1889-92
Dr. Geo. M. Dawson	1892-95
Mr. F. T. Shutt	1895-97
Prof. E. E. Prince	1897-99
Dr. H. M. Ami	1899-1901
Dr. R. Bell	1901-1903
W. T. Macoun	1903-1904

I shall not in this address attempt to tell of the work which the Club has accomplished in past years, as others will speak more fully upon it; but as I am partly responsible for the work of the present one, it may be appropriate for me to say a few words about it.

On being elected president last March I felt that the Club might have made a much better selection, as my record of work for the Club was not very long. I appreciated the honor, however, and determined to do what I could to make the year a successful one. Everything happened to be in our favor this year New life was being stirred in the Club by the Nature Study movement which was interesting so many of the teachers and scholars in the city ; and a spring and early summer with delightful weather for excursions enticed many out to the woods and did much to make them successful. Furthermore, the Club has a capital secretary in Mr. Wilson, and he and the other members of the Council, of which the ladies form a faithful part, were always ready and willing to co-operate with me.

During the spring and summer two general excursions were held and nine sub-excursions. All of these were very enjoyable,

and considerable work was done. These excursions were made as educational as possible, and particular pains were taken by the leaders of the Club to assist students and teachers, of whom there were nearly always a large number and who were most anxious to learn. Full reports of these excursions were published in THE NATURALIST from month to month throughout the summer.

During the year the Botanical and Entomological branches have held meetings at the homes of the members, the Botanical branch having had twelve meetings and the Entomological eight meetings. These have been very enjoyable and profitable to the members.

THE OTTAWA NATURALIST has maintained its high standard, and the 17th annual volume is now nearing its completion. The addition of the Nature Study department, edited by Dr. Fletcher, has done much to make our journal still more popular.

We invite your attention to the programme of soirées for this winter.

On January 5th the Rev. G. Eifrig will give a lecture entitled "The Differences and Correspondences between the Avifauna of Ottawa and the Maryland Alleghanies." This should be exceedingly interesting to Ottawa naturalists as, no doubt, Mr. Eifrig will tell us much about the winter homes of some of our summer birds.

The illustrated lecture of Dr. Barlow on January 19th, on "The Recent Landslide on the Lievre River," will be of exceptional interest as the slide occurred so recently and was of such an unusual nature. Dr. Barlow was over the ground shortly after it occurred, and has many good lantern slides to illustrate it. No less interesting will be Mr. Dowling's address on the same evening on the Newington Bog, which was visited by Mr. Dowling and other members of the Club in the autumn and of which Mr. Dowling has some good slides.

The study of the circulation or diffusion of sap in plants has engaged the attention of many scientists. On February 2nd, Mr. F. T. Shutt, who has carried on some interesting experiments at the Experimental Farm, will discuss this question. The address should be of especial value to teachers and students. On the same evening Dr. C. Guillet will read a paper entitled "Two

Springs," in which he will show how unusual the climatic conditions were this year.

All who have previously heard Dr. R. A. Daly lecture before the Club will be pleased to learn that he has consented to give an illustrated address on February 16th on "A Summer's Cruise on the Labrador Coast." The title sounds well and we feel sure that Dr. Daly will not disappoint those who go to hear him.

The last soirée, before the annual meeting, will take place on March 1st, when Dr. Sinclair will give a lecture on "Color in Nature." This address should be of interest to all naturalists, as color is what gives Nature much of her charm.

After the annual meeting, which will take place on March 15th, we shall have, on April 5th, an evening for practical demonstration of "How to Collect and Preserve Specimens," when short talks will be given while each demonstration is in progress. It is hoped that an evening of this kind will do much towards inducing the younger members to begin some work in Natural History, and to begin it in the right way.

During the winter soirées, the work done by the various branches will also be presented.

The Soirée Committee believes that it has one of the best programmes ever presented before the Ottawa Field-Naturalists' Club, and it is expected that the meetings will be well attended. Admittance is free to all the lectures, but the full privileges of the Club, including THE OTTAWA NATURALIST, which is published monthly, may only be had by becoming a member for the nominal fee of $1.

It is the desire of the President and Council of the Ottawa Field-Naturalists' Club to make the work of the Club as practical as possible, and while investigations in Natural History will continue to be the Club's main purpose there is a strong feeling that as much as possible should be done to assist those who are teaching or are about to teach the young people of this city and elsewhere to see and know and understand by means of Nature's object lessons. Already much has been done by the Club in this direction.

On behalf of the Club, I wish to express our appreciation of the grant which we annually receive from the Provincial Govern-

ment to help carry on our work and which has been of such great aid to us.

Last year we lost in Dr. McCabe one who was a good friend to us. We miss him at our opening meeting where he was usually on hand to give us words of welcome. We have good cause to feel, however, that his successor, Principal White, is in close sympathy with us, and we have found him ever ready to do what he could to further the work of the Club. The fact that Mr. White has invited us to hold all our winter soirées in the Normal School is sufficient guarantee of his good will.

Members of the Club, ladies and gentlemen, I trust that we shall continue to have a successful year and that you will do your part as I hope to do mine to make it so.

MOLLUSCA.

Helicigona arbustorum in Newfoundland.

Adult living specimens of this common British and European land snail were collected by Dr. Robert Bell in the middle of July, 1885, on grassy slopes facing the sea, near the narrows of St. Johns Harbor, Newfoundland. So far as the writer is aware, this is the first time that this species has been found, in a living state, on the American side of the Atlantic. Dr. Bell says that many wrecks of vessels take place on this part of the coast, and that a little farther to the south of the locality where these snails were found, there is a small patch where the common heather (*Calluna vulgaris*) grows. This marks the spot, he adds, where an emigrant ship was stranded, and the beds of the emigrants, which were stuffed with heather, were taken ashore and emptied out.

Dr. Pilsbry has pointed out that *Helix arbustorum*, as this land snail used to be called, is the type and only known species of *Arianta*, Leach, (1831) which is now regarded as only a section of Ferussac's genus *Helicigona* (1819), and which is separated from *Helix* on purely anatomical grounds Von. Martens changed the name *Arianta* to *Arionta*, for etymological reasons, but *Arianta*, (Leach) is not the same as the *Arionta* of American authors.

J. F. WHITEAVES.

Ottawa, Dec. 4th, 1903.

MEETINGS OF BOTANICAL BRANCH.

A meeting of the Botanical Section of the Ottawa Field-Naturalists' Club was held at the residence of Mr. D. A. Campbell on Friday evening, Nov. 20th, 1903. The following members were present: Messrs. Attwood, Blackadar, Carter, Clarke, Eifrig, Leibner, W. T. Macoun, Whyte, Dr. Fletcher and Prof. Macoun.

It is gratifying to see the interest taken by the members in those fascinating problems of plant life which present themselves for solution at every outing. To the general public the plant at the flowering stage is everything. To the dilettante, those fleeting aspects of a plant's life, its color and its odor, are all-absorbing. Interesting as these may be, they are merely a few of the numerous points considered by anyone pretending to take more than a superficial view of the subject.

One of the questions discussed at the meeting was why so many plants at one stage of their season's growth produce what is called the "rosette" arrangement of leaves. Specimens of the following plants were shown: Wild pepper grass (*Lepidium apetalum*), horseweed (*Erigeron Canadensis*), common thistle (*Cnicus lanceolatus*), common mullein *Verbascum Thapsus*), spiny-leafed sow-thistle (*Sonchus asper*), ox-eye or white daisy (*Chrysanthemum leucanthemum*), common evening primrose (*Œnothera biennis*).

These plants, widely different species, exhibit a striking uniformity of plan in the arrangement of the cluster of leaves which they produce in the autumn. Each has a very short stem and many leaves arranged in whorls close to one another. In order to prevent overlapping the lower leaves have longer stalks which push their blades beyond those above them. They were collected about the 10th of November, after the blossoming season. Many plants at that season were caring most, perhaps, for the distribution of their seeds and therefore for posterity, but, in the case of these plants, and of other biennials in general, a preparation of another kind was going on with the same end in view. The rosettes were using the rays of the late autumn sun to build material for an early start the following spring. It was

explained that the rosette arrangement, while not the best, on account of overlapping of the leaves, was, nevertheless, a good one, since the leaves comprising it obtained a large share of sunlight and by the close arrangement held possession of the soil.

Another topic discussed was the relation between the slope of the leaf and the type of root the plant has. In the case of the tap root, which goes deep into the soil, it is an advantage to have the leaves shed the rain toward the main axis ; in the case of fibrous root, which spreads out in all directions, it is better to have the water shed out toward the growing tips of the roots. The latter type of root is able to take the water from a larger area than the former. It is manifestly an advantage to have the water shed over this area about the centre of the plant. Of course the main business of a leaf is to place itself in the best possible relation to light, but the above incidental relation—viz., the slope of leaf to type of root—is important also. The plantain was cited as a probable exception by Mr. Attwood. Since the discussion, a number of specimens of the plantain have been examined at the Geological Survey and the roots were found to belong to an intermediate type.

A branch of a cork elm, brought from the Aylmer Road, was exhibited, and elicited the statement from Prof. Macoun that these trees are now curiously confined to fence corners and roadsides. Seeds are blown into these sheltered places where a better chance is given them to survive. This tree is one of the smaller species of elm. It has a beautiful shape but has not such slender, swinging branches as other species, owing to the disposition of cork.

Mr. Whyte referred to an elm about eighteen feet in circumference standing north-east of McKay's Lake, and advised a pilgrimage to so venerable a patriarch of the suburbs.

A discussion on the size of trees brought out the statement that larger trees grow on the western coast of the Dominion than in the east. Thus, in British Columbia there is a species of maple with leaves and top of enormous size. One of the leaves, measured by Mr. Carter, was 19½ inches by 23 inches. The diameter of the top of a tree, measured by Dr. Fletcher, was 200 feet. This large top and leaf is evidence of absence of wind storms which would play havoc with such an immense tree. The

firs of the coast also present a peculiarity in that their gigantic trunks have a small bushy top and a comparatively small root system. This shows again that the wind force is slight.

The fall blooming of such spring flowers as strawberry, hepatica, and the prairie anemone, was again warmly discussed. One view advanced was that these plants, after a period of rest due to a drought some time during the summer, and having their buds ready, were forced to flower by the recurrence of spring conditions in the autumn. Mr. Eifrig stated that in Cumberland Co., Maryland, he had observed that the fall always produced such flowers no matter whether the preceding season were wet or dry.

The fact that there were no acorns in this region this year was explained by Mr. W. T. Macoun as due to the frost which occurred early in May and killed the flowers.

Mr. Clarke brought up the question of the pendent position of the pods of the locust. Prof. Macoun stated that this was characteristic of the pods of the locust family. In the cress family, however, the pods usually do not hang down but stand erect. This erect position of the pods in the cress family would facilitate the escape of the seeds from the base of the pod which opens before the top. The weight of the pod on the locust, as compared with the strength of the peduncle bearing it, may decide mechanically what position the pod assumes.

The relation of the colors of flowers to their structure was briefly discussed, demonstrating the divergence of opinion among the members on this subject.

D. A. C.

A MISPLACED RAINBOW.

The afternoon of June 2nd, 1903, was bright and pleasant at Innisfail, Alberta ; above, there was a varying number of fleecy white clouds, with a good deal of blue sky exposed between. While driving towards the town about 5.30 p.m., a strange bird-song attracted my attention, and a little observation showed that the singer was high up on the wing. On beginning to search for

him, I noticed at once a most beautiful, and, to me, extraordinary rainbow, if one may use that name for a bow high in the heavens on a day when no rain had fallen. The bow was 25 or 30 degrees in diameter and was almost exactly overhead, lying perhaps 5 degrees north-west from the zenith, and there it hung, like a crown, over the earth—a complete circle, with every part brilliant and perfect. None of our party had ever heard of such a bow before, but reports have been made since then of similar phenonema having been seen in former years. It would be of much interest to know the causes of such an unusual occurrence, and any particulars as to locality and meteorological conditions attending its appearance.

W. E. S.

The killing of small birds by boys and young men has for some years been attracting the attention of bird-lovers, but it has seemed impossible to prevent or even restrict the slaughter of the little songsters, especially during the migratory season when they are most numerous. Cheap rifles and shotguns are responsible for much of the destruction as they are now in the hands of ten boys where one possessed them a few years ago. The members of the Club and all who are interested in preserving the birds and their young will learn with pleasure that, acting on representations made to him by a committee of the Club, the Hon. Frank Latchford has offered to appoint a special officer next spring whose duty it will be to see that the law is enforced. He will lay all informations and make the necessary prosecutions, but will in some degree be at the service of the Club's members in that they will be free to direct him to the districts in which the law is being broken. It is hoped that the services of this officer, aided by the activity of some of the Club's members, will do much to stop the killing of small birds and the destruction of their eggs, a scarcely less reprehensible pursuit.

NATURE STUDY—No. X.

Mineralogy and Geology in Schools.

Loran A. DeWolfe, M.Sc.,
Teacher of Science, North Sydney Academy, N.S.

All earnest teachers will agree that Mineralogy and Geology should be taught in schools, but many feel their incompetence to teach it. To my fellow-teachers, however, I can say that ignorance of the subject need not hinder their attempting it. If you study a few rocks, and then teach what you have learned, the hearty co-operation of your pupils will aid you to surmount all difficulties. I hope to give you a few suggestions without giving material that can be found in any common text book. Supply yourself with an elementary text book, learn the general principles of geology, and start your class by giving oral lessons on what you have learned. Do not give them book facts. Take them to the brook or the beach where the bed-rock crops out in ledges or cliffs. Is it stratified or unstratified? Study its texture, hardness, durability, color, position—in fact everything you or your class can notice about it. How did it get into the position in which you now find it? What is its dip? When you learn these facts from your text book or from some friend, give them to your children, both by questioning and telling, and then request them to study some other ledge themselves and report their discoveries.

Besides the outdoor work in geology, study hand specimens of rocks and minerals in the schoolroom. After the first lesson, you will have no difficulty in securing specimens, for every pupil will bring in stones and pebbles to be named. If you cannot name them, you can study them and watch for a chance to learn the name later on.

I should begin this study with granite, both because it is common nearly everywhere, and because the origin of other rocks can be traced back to it. Give each child pieces of granite of different colors, and pieces of quartz, felspar and mica. On studying the lustre, fracture, cleavage, hardness, etc., of these specimens, the pupils will discover that the granite consists of different minerals, each resembling one of the other pieces given —quartz, felspar and mica. Are all three of these present in

every piece of granite? Which mineral gives granite its prevailing color? When a rock is studied, I should give talks on its uses. The child will look at the next granite tombstone or wall, to see if it is the kind he had in school. He will endeavor to learn something of the methods of quarrying, cutting and polishing—in fact will take an interest in one phase of industrial life that he had not thought of before.

The use of granite as a building stone suggests marble and sandstone, which are used for similar purposes. Let us study their properties, and then their origin. Is marble harder or softer than granite? Would it be more easily cut? How is it affected by dilute acids? There are certain acids in small quantities always present in the air. Decaying vegetable matter gives off *humus* acids, which, in presence of moisture, attack marble. This may be seen in old tombstones overgrown with vines, where the lettering is partly or wholly obliterated. Is marble, then, so durable as granite? In manufacturing cities, more acid is thrown into the air than is normally present. Would it be advisable to use marble for building purposes in such cities? Would granite be better? Would sandstone have any advantages over either? Is it easily affected by acids? Is it cheaper or more easily worked than granite? Fine-grained sandstone is better than coarse-grained, for it will not absorb so much water, which would cause chipping in the winter. Iron pyrites is injurious to sandstone, for, by weathering, it stains the stone and leaves it porous.

Now, for the origin of these stones, we shall return to granite again, and, in learning these two, we shall incidentally learn a few others. Granite, on weathering, breaks up into fragments of quartz and feldspar. The former grinds to sand, and the latter to clay. Since the clay is more finely divided, water will separate it from sand. These are washed into the sea in different layers; finally, by pressure and cementing material, the sand becomes compressed into sandstone and the clay into shale. Through further influence of heat and pressure, the sandstone becomes quartzite, and the shale, slate. These few facts can be elaborated by the up-to-date teacher, who will probably know where beds of some of these rocks are visible. Their dip will be explained in teaching the immediate origin of granite and other eruptive rocks.

Besides these mechanical changes of granite constituents, chemical changes also take place. Felspar contains, among other things, sodium, calcium and potassium. These dissolved out furnish the salts of the ocean. The sodium furnishes the common salt, which under favorable conditions is laid down as beds of rock salt. Teach this in connection with salt mines and salt springs of the geography lesson. The calcium, united with carbonic acid, gives limestone, which in solution is washed into the sea, where sea animals use it to make their shells. These animals die, and the shells collect on the sea bottom as ooze, shell-limestone, etc., according to the kind of animal. This shell mass may re-dissolve and be re-deposited as crystalline limestone cemented by its own material. Under right conditions of heat and pressure, marble is one of the forms of limestone thus originated.

You should now have in your school collection all the rocks and minerals above named—granite, sandstone, quartzite, shale, slate, marble, coral, shell limestone, compact limestone, as well as dolomite and gypsum, which are naturally studied with limestone. Samples of sand and clay of different textures, with the rocks they came from, are necessary to teach the origin of soil.

It would be advisable, too, to make a mineral map of your province by taking a large table, marking off an outline map of the province, and covering it with rocks distributed as they are in the province itself. Mountains should be piled up with their proper rocks. Place a piece of iron ore for each iron mine, but do not place, say, hematite where limonite is mined. Indicate the locality of other minerals, mines and quarries in the same way. A glance at such a map gives the child a good understanding of the mineral wealth of his province, the association of minerals, the reason for location of centres of industry, and a knowledge of the farming lands, for the soil depends largely on the kind of rocks and their durability. On such a map do gold and coal occur in similar rocks? What about coal and limestone? What are the associate rocks of coal? Ask similar questions with reference to other minerals. The boy has learned now that rocks break up to form soils. Does he find in the field or the river-bed rocks different from those of the surrounding country? How did

they get there? Perhaps from their nature it could be guessed where they probably came from, but what about the means of transportation? Here is a chance for lessons on glaciers. Show the children the parallel striation marks on exposed surfaces of bed rock. Are they equally well preserved on different kinds of rock? Compare their direction with that of lakes, hills and valleys, both in your neighborhood and on the map of Eastern North America. If the child can be shown that all harbors and river valleys have probably been gouged out by glaciers, he will know that the gouged out material had to go somewhere,—and the mystery of the gravel hills and drift boulders is, in part at least, solved. The melting of glacial ice, and its southern boundary, are very well shown in the mass of stones and gravel beaches off the New England coast, and in the comparative absence of deep harbors south of Chesapeake Bay.

Innumerable questions arise both to the teacher and the pupil, all of which furnish valuable subjects for lessons. Trace such changes as a pond filling to a swamp, a bog, and finally to a level field. This explains the formation of peat and coal. In Carboniferous rocks, fossils of vertical trees show proof of such filling. Diatomaceous earth (Tripolite), so much used for polishing powder, making dynamite, naturally suggests itself here. So does petrified wood. The next time your children walk across a bog they will have more than mischief to occupy their minds, for you have taught them to read the interesting book of Nature, whose stories have always something new.

Lack of space compels me to leave the subject here. I should like to go into the details of cave formation, growth of stalactites and stalagmites, and call attention to the varied scenery of limestone and gypsum countries. Extremely interesting to the boy, too, would be the manufacture and uses of the common metals. In connection with mineralogy, one could teach such things as the coloring of glass, the glazing of porcelain, the hardening of steel, the manufacture of paints, the making of fireworks, the making of bricks, and scores of other equally instructive facts. The flame tests and bead tests illustrate many of these points.

The teacher who will undertake this work, will find it a pleasant diversion from the more ordinary schoolroom routine. The students will search everywhere for specimens and those on the sea coast will find on ballast heaps some foreign rocks which will be useful for exchanging with teachers of neighboring districts, and in a short time the schoolroom will be adorned with a beautiful and instructive mineral collection.

[The above is an abridgment of a series of papers now being written in The Educational Review, St. John, N.B.]

THE OTTAWA NATURALIST.

VOL. XVII. OTTAWA, MARCH, 1904. No. 12

SOME CANADIAN ANTENNARIAS.—I.

By EDW. L. GREENE.

Several good species not yet described occur in that fine collection of plants which Mr. James M. Macoun brought from the Chilliwack Valley, British Columbia, in the year 1901. Excellent specimens were communicated to me two years since for determination; and I have too long deferred that critical study of them, some of the results of which are subjoined.

A. STENOLEPIS. Stems of pistillate plant slender, a foot high or more: basal leaves small for the plant, about 1 inch long, narrowly cuneate-obovate or -oblanceolate, acutish, scarcely mucronate, appressed-silky on both faces, most densely so beneath, the indument of the upper face less permanent, commonly lying in rolls in the old age of the leaf; cauline leaves linear and oblong-linear, very acute, erect, an inch long and just equalling the internodes: heads about 8 or 10, large, turbinate, long-pedicelled, forming a very lax cyme; pedicels woolly but not in the least glandular or viscid; base of involucre only very scantily woolly, the narrowly linear bracts only slightly scarious-tipped but the tips acute.

Chilliwack Valley, at 2,000 ft., 30 June, 1901, J. M. Macoun; Geol. Surv. No. 26,187. This has the habit of the rather rare Oregonian *A. pedicellata*, but as to characters of involucre it is very different. The pedicels also, in *A. pedicellata*, are glandular and very viscid, of which peculiarity there is not the faintest trace in the Chilliwack plant.

A. CALLILEPIS. Of nearly the size, and quite the slenderness of the last, the basal leaves larger by one-third and tapering to

almost a petiole, green and nearly glabrous above, this face quite glabrous in age; cauline leaves spreading: cyme of 8 to 12 heads rather compact, the short slender pedicels less woolly, greenish and viscid: heads subcampanulate, much imbricated, the outermost bracts oval, the next longer but very obtuse, only the inner lance-linear, not even these very distinctly scarious-tipped, nor even the outermost notably woolly, all of a satiny light-greenish hue.

Chilliwack Valley, at 3,500 ft., 8 Aug., 1901, by Mr. Macoun, No. 26,186. Remarkable for the greenish and glossy involucres, more like those of certain Gnaphaliums than of any other Antennaria.

A. ACUMINATA. Obviously suffrutescent, but the ascending woody and naked basal branches slender and not rigid; flowering branches 9 to 12 inches high and slender; stolons also slender, long and sparsely leafy, their leaves about 1¼ to 1½ inches long, narrowly spatulate, very acute, thinnish, finely but not very densely appressed-silky on both faces; cauline leaves an inch long, erect or ascending, broad at the sessile base, but slenderly acuminate, the almost caudate tips twisted: cymes rather compact, of 6 to 12 heads; involucres greenish and lightly woolly at base, the outer and hardly scarious-tipped bracts oblong, obtuse, the next series more elongated and with broad acutish tips, the innermost series linear and acute, the scarious tips of all these deep pink and slightly incised: male plant not seen.

At 4,000 ft. in the Chilliwack Valley, 8 Aug., 1901, Mr. Macoun; No. 26,179. Only the pink involucres recall the common *A. rosea*, the long soft foliage loosely clothing the stolons, and especially the slenderly and subcaudately acuminate stem leaves mark it as very distinct. No. 26,181 of the same collection, from an altitude of 5,000 ft., I refer here, though it is a smaller plant, and at a younger stage of development, and with involucres that show but a tinge of pink. Again, No. 26,209, also from 5,000 ft., and too young, has almost rose-red bracts. All these plants show old foliage perfectly glabrous above, which is very foreign to the character of *A. rosea*.

According to a collection made in southwestern Ontario, in 1901, by Prof. John Macoun, the following species occur there :

A. NEODIOICA, Greene, Pitt. iii, 184. This was obtained on Cedar Creek near Leamington, 3 June, in good condition, but only the pistillate plant. I have seen no specimens before from any point so far westward.

A. MESOCHORA, Greene, Pitt. v, 111. The type specimens of this western-midland species being from southern Michigan, and the plant being common over quite an extensive range, it was to have been expected from western Ontario lying so closely adjacent to southern Michigan ; and Mr. Macoun's numbers 26,198 and 26,199 represent well this species, the former being from Point Edward on Lake Huron, the latter near Leamington on Lake Erie.

Washington, D.C., Feby, 1904.

THE HORNED LARK.

(*Octocoris alpestris pratincola.*)

The horned lark has arrived this year, in spite of the cold and depth of snow, about its usual time in North Frontenac. Yesterday (Feb. 26th) I saw a small flock of six on the road.

Last year (1903) I first observed it on February 11th, five ; and the nest with young birds on April 20th, just hatched.

In 1902, on March 4th ; and the nest with young, just hatched, on April 17th.

There has been a large migration of pine grosbeaks this winter ; I have seen many flocks. They came early ; I first saw them on November 4th.

C. J. Y

A NIGHT'S COLLECTING FOR MOTHS AT MEECH LAKE, QUE.*

ARTHUR GIBSON.

On the invitation of Mr. C. H. Young, I paid a visit to the above charming place on the evening of the 14th of August last. Leaving Ottawa on the evening train I was met at Chelsea by Mr. Young, and after a lovely drive of half an hour or so, we reached his cottage on the west shore of Meech Lake. As it was my first visit to this delightful, uncrowded, summer resort, I enjoyed the outing immensely and only regretted that I could not spare the time to stay longer.

After we had attended to the inner man, we immediately began to arrange our poison bottles and other collecting apparatus. This done, we started out to "sugar" a number of trees, which had already been used by Mr. Young for that purpose. The term "sugar" has a special entomological meaning; the "sugar" itself is a mixture of molasses and sour beer, which is smeared on to the trunks of trees, fence posts, etc., at dusk, for the purpose of attracting moths belonging chiefly to the family Noctuidæ. Some collectors thin the molasses by adding a small quantity of rum or brandy, but the sour beer is just as good, and is cheaper. This method of collecting moths will be found to give the best results on warm, moist, cloudy nights. As soon as we had sugared about thirty trees, and placed our poison bottles in convenient pockets, we started out on the first round. When two are sugaring it is always best for one to hold the dark lantern, while the other does the bottling, or catching. Care must be taken not to direct the light too strongly, or too suddenly, upon the tree bearing the mixture; if this is done many of the moths will be frightened away. It is also well to have several good poison bottles on hand, to be used alternately after four or five specimens have been caught.

On completing our first round, we emptied our catch into a large poison bottle and were then ready to make the trip again. After having gone the rounds about five times and deposited our

* Read at meeting of Entomological Branch, 19 January, 1903.

specimens in a safe place, we fixed up a large acetylene lamp, which we use specially for attracting night-flying moths, and proceeded up the lake about half a mile from Mr. Young's cottage. Having reached our destination, an unoccupied cottage on the slope of the mountain, we placed the lamp on the southern edge of the verandah, so that the rays would illuminate the front portion of the house The reason this cottage was decided upon was because it had been painted white, and with the light from the lamp directly along the front of the verandah from which it was reflected, much greater attraction was thus extended to insects flying in the immediate vicinity. During good evenings we have collected large numbers of specimens by this method. On the night in question we netted some very acceptable things in the couple of hours spent at this pleasant work.

There is no doubt, however, that sugaring is the most productive way to collect moths. If one wants large numbers of specimens there is no reason why, in a good season, several hundred specimens could not be taken during any favorable evening. On the other hand, however, all night-flying moths will not come to sugar, but many of these may be attracted by lights. Around cities and towns, particularly in the outskirts, the electric light furnishes a splendid hunting ground for many species which one never meets with at sugar. Noctuid moths of many kinds frequent flowers in early evening attracted by the rich nectar, and while there is still natural light, specimens may be captured quite easily.

As to the specimens collected at sugar, *Noctua normaniana*, Grt., and *Trigonophora periculosa*, Gn., with its variety *v-brunneum*, Grt., were extremely plentiful and in perfect condition. Luckily, I had previously never met with either of these species at all commonly, so I took a good series of each. Some of the other very common noctuids were *Hadena dubitans*, Walk., *Feltia subgothica*, Haw., and *Noctua smithii*, Snel. The latter species could have been taken by the hundred. Every now and then one of the large *Catocala* moths would be seen eagerly sipping up the sugar. All the moths of this genus are beautiful creatures, the larger species being particularly striking in appearance. As many as six different kinds of these attractive insects were flying, viz., *Catocala*

briseis, Edw., *unijuga*, Walk., *concumbens*, Walk., *cerogama*, Gn., *ultronia*, Hbn., and *ilia*, Cram. The latter is a new record for the Ottawa district. Only one specimen was seen and this was collected by Mr. Young. Among the more interesting species taken at sugar mention may be made of *Rhynchagrotis alternata*, Grt., *Mamestra vicini*, Grt., *Ulolonche modesta*, Morr., *Noctua rubifera*, Grt., *Ipimorpha pleonectusa*, Grt., *Caradrina multifera*, Walk., and *Tricholita signata*, Walk. At light we netted a few nice examples of *Arctia caia*, L., var. *americana*, Harr., *Apantesis parthenice*, Kirby, *Autographa selecta*, Walk., *Achatodes zeae*, Harr., *Eueretagrotis perattenta*, Grt., some interesting varieties of *Mamestra olivacea*, Harr., as well as several other acceptable species, including some uncommon geometers. *Polystœchotes punctatus*, Fab., a well known neuropterous insect, was fairly plentiful.

The following morning we pinned our captures and I found that my share numbered over 200 specimens, all in good condition. On the afternoon of the 15th we took a tramp up the mountain towards Kingsmere, our object being chiefly to collect larvæ. As the late Dr. Riley said : "The careful entomologist who prides himself on the appearance of his specimens, will rely largely on collecting the early stages and on rearing the insects, for his material." Our chief plan for collecting larvæ was by beating the foliage, holding in one hand a beating net so as to catch any larvæ which might fall. In this way we collected caterpillars of *Schizura ipomœae*, Dbl., *Pyrrhia umbra*, Hufn., *Automeris io*, Fab. (from basswood), *Heterocampa manteo*, Dbl., *Autographa biloba*, Steph., etc. Feeding within the stems of the common dock, *Rumex occidentalis*, S. Wats., we found nearly full grown larvæ of *Papaipema cerussata*, G. & R., the mature insect of which is a very beautiful moth of a rich brown color with purplish and reddish areas and conspicuous whitish spots on the fore-wings. An interesting form of this species, which lacked the white spots on the primaries, was reared by Mr. Young.

The Raspberry Clearwing, *Bembecia marginata*, Harr., seemed to be very plentiful, as I secured, from differents plants, six specimens within half an hour. These little wasp-like moths delight in exposing themselves to the full heat of the sun, being

found resting on the upper surface of the leaves. The larvæ are often very destructive, and as little can be done to prevent the damage, canes infested invariably die.

Meech Lake is a most interesting locality from an entomological standpoint. Mr. Young during his two summers' sojourn there, has collected many insects new to the Ottawa district. Doubtless others also will find the place a most profitable one to explore.

CELEBRATION OF THE TWENTY-FIFTH ANNIVERSARY OF THE FOUNDING OF THE OTTAWA FIELD-NATURALISTS' CLUB.

(Ottawa Field-Naturalists' Club founded March 22nd, 1879.)

The first of this year's soirées was held in the Normal School Hall on December 15th, 1903. In place of the usual conversazione it was thought best to celebrate at that time the 25th anniversary of the organization of the Club, and to bring together as many of the original members as possible. A very enjoyable time was spent at this meeting in recalling interesting facts relating to the early years of the Club.

The Principal of the Normal School, Mr. J. F. White, gave an address of welcome, in which he spoke of his appreciation of the work the Club was doing and of the assistance being rendered to students of the Normal School by its members. The President's address, which was published in the February number of THE NATURALIST, followed, after which five members of the original Council of the Club made short addresses. The first President of the Club, Lieut.-Col. W. White, C.M.G., spoke on "The Study of Natural History at Ottawa before the formation of the Club." The following is part of what he said: "When, in 1865, the seat of government was transferred from Quebec to Ottawa those of us who had been members of the Natural History Society of Quebec were most agreeably surprised to find that in the new Capital there was not only a Mechanics' Institute, with the nucleus of a museum, but also a Natural History Society in good working order with a number of very active members, amongst whom may be mentioned Dr., now Sir James Grant, Professor Webster, the Rev. T. D. Phillips, Dr. Van Courtlandt, Mr. James

Ogilvy, Mr. Rowan and Dr. McGillivray, and in those days activity was very active." Among the expeditions participated in by Col. White were a visit to the cave at Pelissier's, a visit to East Templeton to inspect plumbago and a tramp through the mica districts in the Gatineau hills.

Mr. R. B. Whyte's subject was "Botanical conditions around Ottawa twenty-five years ago." He said that there had been great changes in the collecting grounds during that period. Houses were now standing where good botanizing grounds used to be. Twenty-five years ago there was a small bog in the woods in the neighborhood of Beechwood cemetery in which he found *Cypripedium spectabile*, *Sarracenia purpurea* and *Ledum latifolium*, plants which have long disappeared from that vicinity. The pitcher plant was also found at that time near the old race course along the Bank street road.

Dr. Fletcher spoke of "Ottawa as a Natural History locality twenty-five years ago." He mentioned the old localities where the rarer specimens used to be collected, and said that the rapid growth of the city had destroyed some of the best of these. He stated that there was abundant opportunity for doing good work still, and good localities within easy reach of the city. He referred to the great aid the Geological Survey staff had been to the study of Natural History in the Ottawa district.

Lieut.-Col. Anderson's address related to "The workers in Natural History at Ottawa twenty-five years ago." He said that Dr. James Fletcher had most to do in suggesting and organizing the Ottawa Field-Naturalists' Club, and had been one of the most energetic workers from the beginning. Others who did good work in the early years were Mr. W. H. Harrington, Mr. R. B. Whyte, Dr. H. B. Small, Mr. Walter Billings, Hon. Frank Latchford and Mr. W. L. Scott.

Dr. H. B. Small, in speaking of "What the Ottawa Field-Naturalists' Club had accomplished," gave incidents of the early years of the Club. He brought with him dried specimens of plants collected twenty-five years ago, and said that each plant recalled the place where it had been obtained and other incidents connected with it, and took him back to the time when he was actively engaged in work for the Club He considered that the Club had

done splendid work in studying the Natural History of the district. The results of the labors of the members were contained in the printed transactions of the Club and the volumes of THE OTTAWA NATURALIST. The Club had, during the past twenty-five years, given thousands of Ottawa's citizens pleasant outings in the country, where those who loved Nature had splendid opportunities for study.

Short speeches were also made by Dr. Robert Bell, the Director of the Geological Survey, and Prof. J. Macoun. A vote of thanks was proposed by Mr. W. H. Harrington and seconded by Mr James Ballantyne.

W. T. M.

SOIRÉES.

At the meeting of the Club held in the Normal School January 5th, the Rev. C. Eifrig lectured on "The Differences and Correspondences between the Avi-fauna of Ottawa and the Maryland Alleghanies." The speaker endeavored to show that, although the region under discussion is six to seven hundred miles south of Ottawa, there are not only marked differences in the status of the ornis of Ottawa and the Maryland Alleghanies, but also many and surprising correspondences. This production of suitable conditions for birds, as well as plants, of otherwise widely distant regions, is brought about by the great differences in altitude in that section. And while it is well known that among the high peaks of the Rocky Mountains all the different conditions and areas of floral and faunal life, from the tropic to the arctic, may be found close together, it seems surprising that somewhat similar conditions should exist in the much lesser altitudes of the Appalachian Mountains. The valleys in the westernmost part of Maryland, which are crossed by the Alleghanies, are from 500 to 1,000 feet above tidewater and are in the Carolinian life zone. This is where the differences between here and there come in. The Carolinian belt of the Austral or southern life zone is characterized by such birds as the cardinal (*Cardinalis cardinalis*), tufted titmouse (*Parus bicolor*), Carolina wren (*Thryothorus ludovicianus*), Carolina chickadee (*Parus carolinensis*) and

others being permanent residents there. The bluebird (*Sialia sialis*) also is found there all winter. Higher up, in an altitude of from 1,500 to 2,500 feet, especially on the northern slopes of mountains, we find the animals and plants of the higher and lower transition belts of the Austral life zone, characterized by an overlapping of northern and southern species. In the highest elevations in that section, along the backs of the highest mountains, notably in the primeval hemlock and spruce stands and in the sphagnum and cranberry swamps, in an altitude of from 2,500 to 3,400 feet, the highesr attained in this section, we find many Canadian and boreal species of both fauna and flora. This is where the correspondences between here and there comes in. Of Canadian mammals, *e.g.*, we find there the Canadian white-footed mouse (*Peromyscus canadensis*), redbacked mouse (*Evotomys gapperi*), jerboa (*Zapus hudsonius*), varying hare (*Lepus americanus* v.) etc., found only in these boreal islands. Of Canadian birds we find breeding there the Canadian warbler (*Wilsonia canadensis*), the magnolia warbler (*Dendroica maculosa*), redbreasted nuthatch (*Sitta canadensis*), hermit thrush (*Hylocichla guttala pallasii*), solitary vireo (*V. solitarius*), raven (*Corvus corax principalis*), etc. The plants showing that here Canadian conditions of climate, etc., must exist are, *e.g.*, black spruce (*Picca mariana*), tamarac (*Larix americana*), yew (*Taxus minor*), moose-wood (*Dirca palustris*), cranberry (*Vaccinium macrocarpon*) and many others. Altogether this is a very beautiful and extremely interesting part of North America.

Before an attentive and appreciative audience of Field-Naturalists and their friends, in the Normal School, on the evening of the 9th February, Mr. Frank T. Shutt, M.A., Chemist of the Dominion Experimental Farms, gave a lecture on sap and sap movement, which was academic both as to substance and form. The display of charts, used to make clear difficult points, reminded one of University halls.

After explaining that the term "circulation" was inappropriate as applied to sap movement, the lecturer described the various anatomical structures through which the movement took

place, viz., the root-hairs, where the water enters; the deeper tissues, the fibro-vascular bundles of root and stem, through which the water ascends; the veins of the leaf, along which it proceeds to the intercellular spaces, at the exit of which stand the guard cells of the stomata.

It was pointed out that sap is a dilute solution of food, partly of a mineral nature, taken from the soil, partly of an organic nature, derived from carbonic acid absorbed by the leaves from the atmosphere. The chief mineral constituents are phosphates, silicates and nitrates of potassium and calcium. The chief organic constituents are sugar, soluble proteids and organic acids, with sometimes coloring matters. These are conveyed or carried about in the water, which has the double function of dissolving and distributing this food material. An enormous amount of water takes part in these two processes. Besides the above uses of the water, it is itself food material, and also serves to render the plant turgid, thereby enabling succulent plants to stand erect. The proportion of water in plant tissues is very large, from 40% to 90%, but the amount ot water so represented is very small compared with that which passes through the plant or tree and is lost by transportation. For every pound of dry matter stored up in the tissues between 300 and 400 pounds of water pass out into the atmosphere by the stomata.

The causes of the upward movement of sap were next dealt with. The water enters the root-hair from the soil by osmosis. This osmotic action may be experimentally illustrated by placing a strong sugar solution in a glass cylinder (lamp glass), one end of which is covered by a bladder, and suspending the cylinder in water. To eliminate purely hydrostatic action which might produce movement, have the level of water inside the bladder the same as that without. In a short time the level inside rises, showing that, if an interchange is taking place, more water is entering, than escaping from, the bladder. Some sugar makes its way to the outside liquid. Thus, on purely physical grounds, one may see how water enters the root-hairs of plants. Having entered, it filters through to the deeper cells, and, in the case of the higher plants, ascends chiefly by means of the Xylem elements of the fibro-vascular bandles. This ascent is aided by osmotic

attraction due to transpiration at the leaf above, and also by "root-pressure" from below. Mr. Shutt stated that root-pressure was not well understood, that it could not be accounted for on physical grounds alone, and that we must assume that the vital activity of the cell plays an important part in the rise of the sap.

The flow of sap in the maple was then discussed in detail. For many of the facts upon which he based his statements, Mr. Shutt said he was indebted to Bulletin 103 of the Vermont Agricultural Experiment Station, copies of which, to a limited extent, the Director of that Station had kindly placed at his disposal for distribution among the members of the Club. At the Vermont Station it was established that pressure and flow went hand in hand. Pressure is a cause of the flow, but not the sole cause. Cold nights followed by warm days make the ideal sugar weather. Uniform temperatures, whether high or low, do not favor a flow of sap. The higher temperature, following cold nights, seems to excite the protoplasm to activity. The root-hairs absorb water, and since there is no transpiration, as the buds have not opened, the water accumulates in the tree, setting up a high pressure. Pressure is further increased by the expansion of the gases in the tree due to the rise in temperature. Tapping the tree relieves this pressure. The water, in escaping, carries out with it in solution the sugar which was stored from the previous season in the tissues of the sap-wood. The direction of the movement is principally through the Xylem vessels and downward through the phloem elements, but it is also in every direction, more or less, depending upon pressures, and these again chiefly on changing temperatures. In summer the movement is generally upwards.

The lecturer closed his interesting address by pointing out the utility of a knowledge of plant physiology. To instance but one of several illustrations, he gave his studies and experiments on apple twigs, which showed him that the greater the water-content of the twigs the less hardy they were. This being true, it is obviously advantageous to reduce, if possible, the amount of water in the tree, at the close of the summer, to enable it to withstand the severe conditions of a winter season. Cultivation of the soil of an orchard should not, therefore, be continued in the autumn. A "cover" crop, sown in July, withdrew the moisture

from the soil at that season when the wood was ripening and also served other useful purposes.

The stimulating nature of the lecture was shown at the close by a volley of questions from the members present, and a vote of thanks was heartily endorsed by the audience.

D. A. C.

MEETINGS OF BOTANICAL BRANCH.

A meeting of the botanical section was held at the home of Prof. Macoun, December 10th, 1903. The subject of the evening was "Weeds and the causes that lead to their dispersion." Prof. Macoun introduced the subject by remarking that our weeds were "Aliens" and not "Natives," and remarked that on one occasion while showing an eminent English botanist around the city and its suburbs, the visitor remarked that there was a wonderful similarity between Canadian plants and those of England. He was very much surprised when told that all he saw were aliens and he must go to the woods to see the native plants.

Prof. Macoun further developed his subject by showing that Canadian plants, native at Ottawa, were necessarily incapable of occupying our roadsides and cultivated fields, and hence in the struggle for existence in the open they had no chance with the immigrants. Numerous illustrations were brought forward in support of this, then seed dispersion was taken up and a warm and interesting discussion took place, which was joined in by nearly all present. Dr. Guillet brought up the subject of "Sheep Burrs," to illustrate the methods adopted by various species to assist in the dispersion of their seed, and other members supported his views by many apt illustrations which showed that most of the members held his opinions. After a very animated discussion, Prof. Macoun, as chairman of the meeting, said that while admitting the ability of burrs and seeds of like nature to be dispersed by this method, he denied their necessity and disputed their utility. He showed that the sheep burr had not a general distribution, that it was largely a roadside plant, was hardly ever found in fields, and in fact, was very limited in its distribution.

The burdock and "beggar ticks" were of the same character and were also limited in their distribution. As a contrast to this Prof. Macoun mentioned the mustard family as a weed producer and showed that this order had no special means of dispersing its seeds, and yet the worst weeds we had belonged to this family. Another animated discussion took place and the conclusion was reached that the *Cruciferæ* produced great numbers of small seeds that could lie in the ground for years, and germinate just when the right conditions existed. It was shown by Mr. Hamilton that seeds of *Polygonum* must have lain in the soil in Montreal for at least 30 years. Earth which had been thrown out when making a drain produced a full crop, although for 30 years it had been covered by a building. Dr. Fletcher mentioned the case of *Thlaspi arvense* in Manitoba, which appears just when it is suited with the conditions and when its chances are poor it disappers.

Many side issues were introduced and discussed, and the general opinion was reached that weeds like the house sparrows had been battling for centuries against all manner of adverse circumstances, and on this account were better able to succeed in the battle of life than our native plants, which never had any trouble to overcome, hence when their environment is disturbed they fade and die and only live in the memory of woodland dreamers. Amongst other subjects discussed was the modes of dispersal of *Nasturtium officinale*, and it was decided that seeds were only secondary in this. This led to talk of other members of the same genus and Dr. Fletcher cited *N. lacustre*, which formed little rosettes in the autumn. Another member mentioned the bladder wort, and explained how the extreme tips of the stems fell into the mud after the first frost and became the new plants the next season. In a few words Prof. Macoun showed that nature never failed in its work, that when the seeds could not ripen they formed buds or bulblets, that the tips of many plants ceased to grow in the late summer and the plant stored up in them concentrated food. These tips sank to the bottom of stream or pond and became the new plant in the spring.

Colds, absence from the town, prior engagements, etc., made the attendance very slim at the meeting of the Botanical section of the Field-Naturalists' Club held at Mr. Guillet's house, 8 First avenue, on the 28th January. Only the following attended: Dr. Blackadar and Messrs. Whyte, Campbell, Attwood and St. Jacques. Mr. Whyte brought a great package of beautifully illustrated works on plants and gardening. From these and a few others Mr. Attwood made a bibliography which will be published in THE NATURALIST. The opinion was expressed that popular works on botany are of little use to any earnest student, as they take him but a little way and then leave him to grope as blindly as at the beginning, simply because they are not systematic or comprehensive, but give mere scraps of information. The proper way to learn plants is to get a systematic work on classification, a good handbook such as Gray's or Britton's, and then begin at once to make a herbarium, pressing and classifying one's plants as one learns them. Ten plants clearly mastered in this way are worth a hundred hazily named with the aid of Mrs. Dana's pictures of flowers or Mr. Matthew's pictures of leaves.

Mr. Guillet showed the members two charming works on the natural history of two regions of South America, namely, H. W. Bates' "The Naturalist on the River Amazons," 1863, and W. H. Hudson's "The Naturalist in La Plata," 1895. There are several other excellent works similarly named, viz., Belt's "The Naturalist in Nicaragua," 1874, and W. Saville-Kent's "The Naturalist in Australia," 1897. Darwin's "A Naturalist's Voyage Around the World," 1845, might also be mentioned, as well as Wallace's "The Malay Archipelago," 1868. Who will write a book worthy to rank with these and entitle it "The Naturalist in Canada"? Seton-Thompson might have done it, had he not, like Grant Allan, turned aside to work doubtless more remunerative, but certainly less solid, worthy and permanently interesting.

Before reading his paper, the convener made a few remarks concerning the conduct of such a little club within a club as is the Botanical section. He thought that as far as possible the topics of each meeting should be announced beforehand for the sake especially of the more inexperienced members, who would have a chance to prepare to discuss or at least to listen the more in-

telligently. He also thought it would not be out of place for the section now and again to resolve itself into a seminary for the hearing and criticism of one of the papers in preparation for the public soirées of the Club ; that such papers might be made more truly representative of the best the Club had been able to do during the year. The convener then read his paper on "The Relationship between the Weather and Plant-growth," and received several helpful criticisms from the members.

While the members were discussing some Northern Spies from the convener's native county of Northumberland—the finest apple-growing district in the world—he showed them some views illustrating the natural history and other out-of-doors work done by his pupils.

Several interesting botanical and zoological specimens were shown, most of which, on account of the absence of Prof. Macoun and Dr. Fletcher, had to remain unidentified. Mr. Campbell had a pretty mounted specimen of the shed skin of a frog's foot. An hepatica was shown just coming into bloom. Two of Mr. Guillet's pupils have succeded in getting hepaticas, and one, Spring Beauties to bloom in the house this winter.

On account of the absence of the above-named members, the topic "Protective Color Changes in Animals" was left over for another meeting, as these gentlemen were expected to contribute original observations on the subject, and Mr. Guillet had only the observations of others—especially Pouchet and Biedermann—to offer.

MEETINGS OF ENTOMOLOGICAL BRANCH.

Meeting No. 5 was held on March 12th, 1903, at Mr. Harrington's ; eight members present. Dr. Fletcher said that he had forwarded to Mr. Needham a drawing of the dragon-fly nymph-case shown at the previous meeting by Mr. Halkett, and that it proved to be that of *Hagenius brevistylus*, not previously recorded from so far north as Spanish River. Mr. Halkett showed a water-bug (*Corixa* sp.) which had been received with whitefish eggs from Selkirk, Man., and stated he had seen these water-bugs in immense numbers when visiting the hatchery there. Mr. Richard

showed some butterflies, including *Pamphilus manitoba*, from Isle Verte, Que.; *Grapta gracilis*, from Langevin, Que., and *Argynnis cybele*, *A. atlantis* and *A. aphrodite*. Dr. Fletcher pointed out how these species could be distinguished, and discussed their range. Mr. Gibson and Mr. Metcalfe also spoke of the abundance of the last named at Toronto. Dr. Fletcher read a note on *Deilephila galii*, and made some useful observations on incorrect terminations of specific names. He also spoke of the so-called rarity of insects, pointing out that, while there are certain species which seem actually to be rare wherever they occur, the majority of so-called rarities are taken in abundance when what may be called the metropolis of the species has been found. He instanced *Liparocephalus brevipennis* and *Ægialites debilis*, beetles of which only a few specimens had been known until Rev. J. H. Keen had taken them abundantly; the first at Masset, Q. C. Islands, and the second at Metlakatlah, B.C., where he had carefully studied its habits. Mr. Harrington exhibited specimens of *Blastophaga psenes*, a curious little Chalcid wasp which pollinates the Smyrna figs, and read a note on the efforts made by the fig-growers of California to establish this insect in their orchards, so that the quality of their figs might be improved.

Meeting No. 6 was held at Dr. Fletcher's on March 26th, 1903; four members present. Mr. Metcalfe exhibited a fine series of four species of Argynnis, and mentioned the great abundance of *A. cybele* at Grimsby upon flowers of Teazle (*Dipsacus*), to which also three species of day hawk-moths were attracted. Dr. Fletcher exhibited, as representatives of the Satyridæ, which had been discussed at a previous meeting, a collection of very fine Morphos, and made some remarks on the flight and habits of certain species of these large and brilliant butterflies. He also showed a Denton tablet mount of the magnificent *M. cupris*, and similar mounts of *Gonepteryx mærula*, *Callidryas lurina*, *Papilio troilus* and *Parnassius apollo*. Mr. Harrington reported on the progress he had made in rearranging his Ottawa coleoptera and showed the last case prepared, containing about 75 species, commencing with Tricopterygidæ and ending with Cucujidæ, many of the smaller species being yet undetermined. Some discussion followed upon

Coccinellidæ; Mr. Metcalfe instancing the occurrence of *Megilla maculata*, at Grimsby, upon dandelions in such numbers as to give the flowers a pink appearance. Dr. Fletcher said the beetle had been abundant in 1902 upon corn in his garden. He then read a letter from Mr. J. W. Cockle, of Kalso, B.C , enclosing a list of over 600 species of moths collected by him at that point, and including many new and rare species. An interesting paper was received from Mr. Wickham, entitled "The Beetles of an Oregon Sea-beach."

Meeting No. 7 was held at Mr. Harrington's on April 9th, 1903: six members present. Mr. Metcalfe exhibited a box of coleoptera from Grimsby, Toronto and Port Hope, including many interesting species, such as *Carabus sylvosus*, *Notiophilus æneus*, *Hister militaris*, *Ryssodes exaratus*, *Phymatora pulchella*, *Corymbites virens*, etc. Dr. Fletcher read a paper, newly received from Dr. Scudder, on "Hunting for Fossil Insects," the account of a trip to the celebrated Florissant beds. After some discussion of the occurrence of fossil insects in Canada, and on some of the insects which had been already noted this spring, Dr. Fletcher gave, incidentally, the description of a visit to a heronry in the Moose Mts., Man., the herons being locally known as fish-ducks. The question was considered of special lines of work for the collecting season and the members selected as follows: Halkett, aquatic insects; Gibson, basswood insects and arctians; Metcalfe, hemiptera; Richard, butterflies; Harrington, spruce insects and sawflies; Fletcher, Geometridæ, Plusiidæ and dragon-flies, with special attention to the life-histories of insects. Mr. Harrington showed 65 species of insects which he had obtained from a little moss collected in the swamp on the Experimental Farm near the canal.

Meeting No. 8 was held at Mr. Halkett's on April 23rd, 1903; six members present. Mr. Gibson and Mr. Halkett exhibited insects taken at the Club excursion to Blueberry Point, Aylmer, on the previous Saturday; among these were *Cychrus lecontei* and *Aphorista vittata*. Mr. Halkett also spoke of the mosquito larvæ he had there collected. Mr. Richard showed some beetles recently captured, including three specimens of an undetermined elater.

The species had been taken at the same locality near Rockcliffe by Mr. Harrington in April, 1883. Mr. Gibson read a paper on "Hunting for Caterpillars," describing their hiding places and traps that can be placed for them. Dr. Fletcher exhibited root-galls, from a Japanese rose in his garden, produced by *Tribalia rufigaster*. The galls had been so abundant as to seriously injure the bushes. Our native roses are also subject to the same infestation. Mr. Harrington mentioned that he had sent similar galls some years ago to Mr. Ashmead, who had expressed his pleasure at ascertaining the food-plant of this gall-fly. Dr. Fletcher read an article by Capt. Brown of Auckland, N. Z., on "The Wharf Borer," which had caused serious loss in Auckland by the depredations of the larvæ in paving blocks and wharf timbers. The insect in question, *Nacerdes melanura*, has been found in Ottawa, but is more abundant in seaports. Mr. Harrington showed a series taken by Prof. Macoun on Sable Island, and also examples of all the other Œdemeridæ known to occur in Canada.

Meeting No. 9 was held at Dr. Fletcher's on May 7th, 1903; eight members present. Mr. Harrington showed some beetles, including *Anisodactylus sericeus*, new to Ottawa and not on the lists of the Ontario Entomolgical Society, and a Platynus taken at Aylmer and apparently not previously found at Ottawa. Mr. Metcalfe exhibited specimens of *Emphytus cinctus*, a rose-saw-fly, which he had found common in Mr. Scrim's rosehouses on April 26th. Dr. Fletcher spoke on a fine series of the hitherto very rare beetle *Ægialites debelis* received from Rev. J. H. Keen of Metlakatlah, B.C. Mr. Metcalfe exhibited beetles and hemiptera recently captured, including *Eurymycter fasciatus*, *Mysia pullata*, *Donacia æqualis*, etc. Mr. Halkett showed a living larva of *Hydrophilus triangularis* and pupæ and imago of mosquito from larvæ collected at Aylmer excursion. Dr. Fletcher showed *Orthesia insignis*, or white-fly, from greenhouses; also *Bruchus rufimanus*, the bean-weevil, and explained the difference in habits of this species and of *B. pisi*, the pea-weevil. The latter lives singly in the peas and does not attack the dry or stored seeds, while the former attacks dried beans and several may intest one bean, and it also infests seeds of tares. The larvæ of the pea-moth attack the

seeds externally, being thus easily recognized. Mr. W. T. Macoun showed specimens of the pea-weevil from peas grown on the Experimental Farm, and said only one variety appeared to be attacked. Dr. Fletcher exhibited eggs of the rare moth *Apocheima rachelæ*, and a male imago. The female he said was wingless. He showed, also, examples of a rare moth (*Leucobrephos*) which had been taken by Mr. Hanham and Mr. Criddle. He suggested *Colias philodice* as a desirable species for any person wishing to make a start at breeding lepidoptera ; the food-plant, clover, being easily obtained and the butterfly passing through all its stages within a month. Mr. Gibson showed several species of lepidoptera.

Meeting No. 10 was held at Mr. Harrington's on June 10th, 1903 ; seven present. Mr. Gibson showed a female of *Hypantria textor* mounted as in the act of ovipositing, with egg-mass on leaf; also examples of *Phragmetobia rubicosa* bred from larvæ exhibited at meeting No. 8. Dr. Fletcher made the following exhibits : *Lixus concavus* from Harrietsville, Ont., in which district the beetle has been found boring in the stalks of rhubarb ; *Apocheima rachelæ*, male, female and inflated larva ; blackberry canes, covered with and killed by, the scale-insect, *Lecanium Fitchii*, whose habits were outlined ; three species of horse-flies (*Tabanus*). He mentioned that, at the sub-excursion on the previous Saturday to Leamy's Lake, *Podisus modestus* had been observed feeding upon canker-worms, which were abundant, and that the beetles of *Hoplia trifasciata* were numerous on viburnums of two species. Mr. Metcalfe showed three boxes of hemiptera recently collected and including, apparently, some forms not before observed from Ottawa. Mr. Richard exhibited some lepidoptera, among which were *Platypteryx arcuata*, *Nisoniades juvenalis*, and *N. icelus*. Mr. Halkett showed a wasp's paper nest, and nymphs of some species of dragon-flies. Mr. Harrington showed several of the large pear-shaped cocoons of the spider *Argiope riparia*, which had been found in the tops of spiræa in the Beaver Meadow at Hull. He also showed two boxes, chiefly hymenoptera, diptera and coleoptera, collected recently, and pointed out several species which appeared to be new to our collections. Among these was a handsome Chrysops, the flies of which genus are very aggressive and are generally known as deer-flies. An interesting beetle was a female *Monohammus scutellatus*, a species of pine-borer, having an extra front leg.

NATURE STUDY—No. XI.

NATURE STUDY AND RURAL EDUCATION.

J. W. HOTSON, M.A., Principal, Macdonald Consolidated School, Guelph, Ont.

Few things are of more vital importance in moulding the destiny of a nation than the system of education in its rural districts. The most progressive nations of to-day have recognized this fact, and are making strenuous efforts to raise the standard of efficiency in rural education. Canadians, perhaps, more than any others, should not be slow in recognizing the importance of this phase of education, or in availing themselves of improvement in it. The geographical position, the climate, the vast prairies of the West, make Canada's greatest industry essentially agricultural. Nearly seventy-five per cent. of her population live in the country and are educated in rural schools. The greatness, the stability, the very backbone of this nation is its rural population. More than ever before, the future of this country depends upon its public schools. Since this is true, how important it is that the education of the rising generation of this great nation should be carefully and jealously guarded! I have great faith in the rural school, in its power to mould and build up a national character; but new educational methods must be employed before we can hope for the best results.

The public school system of to-day is a product of the university. "The greatest achievement of modern education," says Payne, "is the gradation and correlation of schools whereby the ladder of learning is let down from the university to the secondary schools and from there to the schools of the people." If this be true, it is no wonder that the present system of education has failed to produce the best results in the lives of the boys and girls of the country. Our educational system tends to lead to professions rather than to the farm. City things have been taught rather than country things, and, by ignoring the farm and the farm home, our greatest industry, farming, and our best institution, the farm home, have been discredited. Our modest farm homes stand as our greatest bulwark. Guard them!

If education is a preparation for real life, and I believe it

should be, and seventy-five per cent. of our population are in the rural districts, depending directly on the soil and its products, and if we believe in the principle of "the greatest good to the greatest number," then, rural education should be a preparation, at least in some degree, for life on the farm. It should lead the child into a more sympathetic relation to his daily life "to the end that his life may be stronger and more resourceful." This does not mean that these schools should teach only the art of cultivating the soil. Rural education should be broadened not narrowed. It cannot be broadened by teaching agriculture only; boys and girls must have a knowledge of language, history, mathematics, etc. Language is a mind tool; the hoe a hand tool. Training in the use of either may be education; but, for best results, they must go together.

In order to develop the trained hand and cultivated mind, more emphasis should be laid on the method of acquiring the information than on the information itself. Mere facts, however important, are not all of education—they are of secondary consideration. How the child acquires those facts, is of vastly more consequence from a pedagogical point of view. The pupil should, as far as possible, be led to rely upon his own resources. He should be led to investigate problems for himself and thus acquire his knowledge first hand. It is the thinking man, "the reasoning and the reasonable man," that makes "the good citizen and the honest neighbor"; so it is the child that is taught to see things as they really are, and to think for himself regarding the things he sees, and is thus led to draw correct conclusions from what he sees, that makes "the reasoning and the reasonable man," "the good citizen and the honest neighbor." In training the eye to see, the ear to hear, and the mind to perceive, we have done much to aid the child in understanding the more complex things in real life. It may not be true "that only those things are useful which one finds out for himself," but no one will deny that from the ideal as well as from the economic point of view of education, those things are of most use which one finds out for himself. But the world is too wide and life too short to turn a child out by himself and expect him to come, unaided, to even a fair understanding of the mysteries of nature; yet, give him a wise and careful instructor, and he may be led to see how nature solves her problems and thus be better prepared to solve those problems of life which confront everybody, and which each individual must solve for himself

Is all being done that can be done to improve rural educa-

tion? I fear not. It is certainly gratifying to know that the educational authorities in most of the provinces have recognized the necessity of doing something to improve it. Never before in the history of Canada have the prospects looked so bright for an honest effort on the part of the best educators to solve this problem. The solution lies, it seems to me, in the proper presentation of Nature Study, or rather that phase of Nature Study that will tend towards agriculture. This can be presented to the best advantage by establishing a school garden in connection with each school. Nature Study and the School Garden are inseparable if we wish the best results. This does not mean that technical agriculture is to be taught, far from it. Nothing would be more disastrous to the cause of rural education than to attempt to teach technical agriculture or technical science in the public school. We have agricultural colleges and high schools for that purpose. Nature Study in our public schools would interest the children in the common every-day things about them; in things they have been seeing all their lives, yet not perceiving; in the songs of birds and insects they have been hearing, yet not appreciating. They would find themselves in a new world, or rather in their old world made new, by a living, loving sympathy and interest in everything about them. Their eyes would be trained to observe, their ears to hear, and their minds to seek the truth for the truth's sake, and in seeing, in hearing, and in seeking for truth, they would be trained to draw right conclusions from what they see and hear.

During the first five or six years of a child's existence he has created for himself a little world. He has attempted to solve many knotty problems. In fact, he has been on a tour of original research, as truly as the best investigator along the line of science, and no one will deny that in many cases he has been more original. He has started out along the right line to make himself "the good citizen and the honest neighbor," and to acquire those things that go to make up a "successful life." Why not continue these experiences in the school? Why not begin to build on what he already knows, rather than thrust him, as is too frequently the case, into a new and strange world—the school—a world in which he searches in vain to find something to link with his past? Alas! he finds himself as totally amidst new surroundings as if he had been suddenly set down in a foreign land. There is nothing in the school life that he can associate with his own little world—his past experiences. He has, as it were, to start life again and create another world totally different from the first. There is little wonder that teachers find such great difficulty with their primary classes, with the beginners in this new life.

Let me make an appeal for more natural teaching in our rural schools—teaching that will look to the pleasure and comfort of the child, and also that will tend to prepare him for the life he is to live. This can be done best, as already stated, by the proper use of Nature Study and the School Garden.

If, then, the rural school is to fulfil its mission to the community, as the handmaid of agriculture, it must be a school adapted to the needs of the community. *It must be an adaptation of education to need.* Whose needs? The farmer's. To meet these he must have the advantage of the best schools; and the best schools for him are those which teach him the things that he needs to know. What does he need to know? What are his educational needs? As a man and a citizen, he needs to know just what other people do—no more, no less. He needs to know how to read, to write, to compute, etc. As an agriculturist, his needs are more special. He deals with the natural world. His enjoyment and his livelihood depend largely upon his understanding of the laws that control the world about him. He must therefore know Nature. He can know her best by becoming interested in her. When he is young is the time to engender an interest that will continue throughout life. The farmer above all others should be a thorough nature student, and one of the purposes of the public school should be to help and direct him in these studies.

One of the great aims of Nature Study is to interest the child in agricultural problems. The School Garden more than anything else will achieve this purpose. Such a garden will be indispensable in the schools of the future. Ere long it will be as much a part of the regular equipment of the school as books, blackboards, charts and apparatus are. The making of a School Garden is an epoch in the life of each school; it marks the progress of the school in pedagogical ideas. Its prime motive is not to be ornamental, but to be useful. In many parts of England and Germany it is rapidly becoming the "school"—the place where most of the instruction is given. This is the ideal method, "a school in the country, where hardihood of life can be cultivated, and where life is simple and varied; a school where masters lead a common life with the boys, working at gardening or plowing, as well as with books. In such a school, work consists of interchange of occupation—continuous but varied; some lighter, some severer, some taxing muscles and some brain. In such a school there is established a collective, corporate life, in which each member learns self-reliance, individual responsibility and constant adjustment of the relation of self to other people. The virtue that here grows up, will not be negative—constrained by external forces—but active virtue that springs from having lived in a well-organized community.

THE OTTAWA FIELD-NATURALISTS' CLUB.

UNDER THE DISTINGUISHED PATRONAGE OF THE RIGHT HONORABLE THE EARL OF MINTO, GOVERNOR-GENERAL OF CANADA.

PROGRAMME OF WINTER SOIRÉES, 1903-1904.

1903.

Dec. 15.—TWENTY-FIFTH ANNIVERSARY OF THE FOUNDING OF THE CLUB.

Address of Welcome, by Principal J. F. White, of the Normal School.

The President's Address.

The Study of Natural History at Ottawa before the Formation of the Club. Lieut.-Col. W. White, C.M.G.

Botanical Conditions Round Ottawa twenty-five years ago. R. B. White.

Ottawa as a Natural History Locality twenty-five years ago. Dr. James Fletcher.

The Workers in Natural History at Ottawa twenty-five years ago Lieut.-Col. W. P. Anderson.

What the Ottawa Field-Naturalists' Club has accomplished. Dr. H. B. Small.

1904.

Jan. 5.—*The Differences and Correspondences between the Avi-fauna of Ottawa and of the Maryland Alleghanies.* Rev. G. Eifrig.

Report of the Geological Branch.

Jan. 19.—*The Recent Landslide on the Lièvre River.* Illustrated by lantern slides. Dr. A. E. Barlow.

Report of the Ornithological Branch.

Feb. 2.—*Sap and Sap Circulation.* F. T. Shutt, M.A.

Two Springs. Dr. C. Guillet.

Feb. 16.—*A Summer's Cruise on the Labrador Coast.* Illustrated by lantern slides. Dr. R. A. Daly.

Mar. 1.—*Colour in Nature.* Dr. S. B. Sinclair.

Report of the Entomological Branch.

Mar. 15.—**Annual Meeting.**

Report of the Zoological Branch.

Report of the Botanical Branch.

April 5.—Short Talks on how to Collect and Preserve Specimens, with Practical Demonstrations by various members of the Club.

All the meetings will be held in the Normal School, at 8 o'clock p.m. sharp, on the first and third TUESDAYS of the month.

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Treasurer, A. GIBSON. (Central Experimental Farm.)

Secretary, W. J. WILSON. (Geol. Surv. Dept.)

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INDEX

TO THE

OTTAWA NATURALIST, VOL. XVII, 1903-4.

PAGE

Anniversary, Celebration of 25th 207
Antennarias, Some Canadian . . 201
Attwood, A. E., Summer course at Norway Beach 113

Beetles of an Oregon Beach . . . 49
Bird Study 97
Book Notices 128, 142
Botanical Branch, Report of meetings . . 38, 58, 93, 178, 180, 193, 213
Botanical Section, Report of 71
Burman, Rev. Wm. A., Moose with Elk Antlers 57

Campbell, D. A., The Need of Nature Study 61
Cardioceras, Description of a species of 65
Caterpillars, Hunting for 77
Chickadee, Hudsonian, Notes on nesting habits of 92
Corallorhiza striata, Lindl. 76
Council, Report of 7
Creeper, Brown, Notes on nesting habits of 92
Crows, My Pet 101

Dent, W. A., Bird Study 97
DeWolfe, Loran A., Mineralogy and Geology in Schools 147
Dowling, D. B., How Peat is manufactured into fuel 175
Dryptosaurus incrassatus, The lower jaw of 133

Eagles and Ospreys, Our 186
Entomological Branch, Reports of meetings 36, 216
Entomological Branch, Report of, for 1902 107

PAGE

Entomological Society of Ontario, Report of meeting 112
Evans, A. W., Yukon Hepaticæ. 13
Excursion, General, to Chelsea. 95
Experimental Farm, Nesting of birds at 24

Fletcher, James, Nature Study . 45
Notes on Macrae's Coral-root. 76

Gibson, Arthur, A night's collecting of moths at Meech Lake 204
Hunting for Caterpillars 77
Greene, Edw. L., Some Canadian Antennarias 201
Grosbeak, Pine 163
Grouse, Canadian ruffed 163
Guillet, Cephas, Curiosity of Hummingbird in captivity . . 55

Hawk, A red-shouldered, in captivity 53
Hay, G. U., It is the spirit which gives Nature Study effect . 145
Hedley, R. T., A red-shouldered hawk in captivity 53
Helicigona arbustorum in Newfoundland 192
Hepaticæ, Yukon 13
Herring Gull's Eggs 112
Holm, Theo., Biological Notes on Canadian species of Viola 149
Hotson, J. W., Nature Study and rural education 221
Hummingbird, Curiosity of 55
Hunting for Caterpillars 77
Halkett, A., Note on *Hagenius brevistylus* 56
Note on Herring Gulls 112
Hagenius brevistylus, Selys. . . . 56

PAGE

Introduced plants, Some 144

Kells, W. L., Nesting of some Canadian Warblers..... 68

Lambe, L. M., The lower jaw of *Dryptosaurus incrassatus*.... 133
Lark, The horned..... 203
Lily, Winter growth of a water.. 107
Lituites undatus, Additional notes on 161
Lituites undatus, Notes on some Canadian 117
Lizard, Note on blue-tailed 60
Lochhead, Prof. W., Nature Study with advanced classes 129

Macoun, W. T., Nesting of birds at Experimental Farm..... 25
The practical aspect of Nature Study 181
Map of Ottawa District 52
Marsh dwellers, Remarks on some 169
Matheria, New species of..... 32
Meech Lake, A night's collecting of moths at 204
Members, List of 4
Mesoptychia, New genus 15
Mesoptychia Sahlbergii, (*Lindb. & Arnell.*) 15
Mineralogy and Geology in Schools 197
Moose with elk antlers 57
Moths, A night's collecting of, at Meech Lake 204

Nature Study papers. 45, 61, 77, 97 113, 129, 145, 165, 181, 197, 221
Nature Study and rural education 221
Nature Study, It is the spirit which gives it effect..... 145
Nature Study, The need of 61
Nature Study, The practical aspect of 181
Nature Study, The proposed course in, in public schools.. 165
Nature Study with advanced classes 129
Nesting of birds at Central Experimental Farm 24
Norway Beach, Summer course at 113

PAGE

Odell, W. S., Winter growth of a water lily..... 106
Oregon Beach, The Beetles of.. 49
Ornithological Branch, Report of 32
Orthoptera, The, of Indiana.... 142
Ottawa District, Map of 52

Perrin, Emery, A robin story ... 122
A self-healing wound 112
Peat as a fuel 175
Peat bog, A woman's visit to ... 172
Petrography of some igneous rocks 85
President's Address..... 188

Rainbow, A misplaced..... 195
Rat, A, as an entomologist..... 57
Robin story, A..... 122

Scott, M. McK., A woman's visit to a peat bog..... 175
Silver, L. P., Petrography of some igneous rocks..... 85
Smith, L. H., My pet crows.... 101

Soirées, Reports of 209
South, A visitor from the..... 177
Squirrel, Red, as an insect collector 73
Sub-excursions 42, 73, 110, 140
Summer course at Norway Beach 113

Terrill, L. M., Notes on nesting habits of brown creeper and Hudsonian chickadee 92
Remarks on some marsh dwellers 169
Treasurer's Report 12
Truffles, The artifical cultivation of 128

Viola, Biological notes on Canadian species of 149
Viola lanceolata, L..... 59

Warblers, Nesting of some Canadian 68
Weed A, worth growing 143
Whiteaves, J. F., Additional notes on *Lituites undatus*.. 161
Description of new species of *Matheria*..... 32
Description of a species of *Cardioceras* 65

PAGE

Whiteaves, J. F., *Helicigona arbustorum* in Newfoundland.. 192
Notes on some Canadian specimens of *Lituites undatus* ... 117
Wickham, H. F., The beetles of an Oregon beach 49
Williams, J. B., Notes on the blue-tailed lizard 60
Wound, A self-healing 112
Young, Chas. H., A visitor from the south..... 177
Young, Rev. C. J., Our eagles and ospreys..... 186
Yukon Hepaticæ 13

Zoological Branch, Report of... 34

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